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TOWN AND COUNTRY SCHOOL BUILDINGS

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TOWN AND COUNTRY

SCHOOL BUILDINGS

A COLLECTION OF PLANS AND DESIGNS

FOR

SCHOOLS OF VARIOUS SIZES

GRADED AND UNGRADED

WITH

DESCRIPTIONS OF CONSTRUCTION, OF SANITARY ARRANGEMENTS, LIGHT, HEAT, AND VENTILATION

BY

E. C. GARDNER

ARCHITECT

Author of "The House that Jill Built," "Homes and All About Them," "Common-sense in Church-building," etc.

NEW YORK AND CHICAGO

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INTRODUCTION.

THERE is no need of an extended argument to prove that successful government by the people of this or any other country is impossible unless the people are educated; what is scarcely less important, their education must be homogeneous. It may well be questioned whether a certain amount, and a considerable amount, of education in the common schools should not be required of all who participate in government even to the extent of exercising the right of suffrage.

Private, special schools of all kinds, scientific, literary, religious, ethical, have their important place; but the fundamental intellectual training of the citizens of a republic must be the homogeneous training of the public institutions of learning. Neither is an argument necessary to demonstrate that whatever we build, house, tower, or nation, its permanent existence depends upon the foundation; if that is secure, the superstructure if wisely planned may grow indefinitely in grandeur and might; if it is defective, the grander the superstructure the more terrible will be its ruin. There is, however, this point where the analogy between the foundation of the inanimate building and that of the nation ceases. In the case of the building, the foundation once laid is laid for all time; with the nation it must be perpetually changed, because with every generation we have a new republic, composed of new materials, having new duties, new problems, new dangers, and new conditions of existence. It is not true of institutions large or small, public or private, which are composed of intelligent, active men, that their foundations may be permanently laid at the outset. Whenever this is attempted the result is stagnation, mortification, and ignominious collapse.

Yet the important fact remains that at the present time the public school is the only possible basis for popular government. Of course the converse of this is true; that it is only in republics that popular education is either possible or, so far as government is concerned, desirable.

This book, it hardly need be said, deals with only one phase of the common-school question, and that a purely external one—the buildings. Not indeed the most important element in education, but a highly essential one. Possibly the generation that has passed away was so eager to get the wisdom of books that the visible appearance of the temple was of no moment. Our fathers may have been so anxious to gather the fruits of the tree of knowledge that they were indifferent to close, dirty, poorly lighted, poorly warmed, and non-ventilated rooms. That state of affairs no longer exists. If the public school is to be popular, if it is to do the work that must be done, if it is to exert the influence and gain the respect that is due to the fundamental institution of the country, its external equipment must be worthy of its high service. There must be the same regard for sanitary considerations in the heating, lighting, and ventilation that is exercised in the best private houses. There must be a thoughtful and scientific study of all matters of convenience and safety, and there must be in addition to this a wise provision for the cultivation of the æsthetic sense which is nowhere so easily developed as in children, and nowhere more imperatively needed than in their training.

Wherever a well-situated, well-planned, thoroughly constructed, and beautifully designed public school-house, large or small, has been built, there is sure to be found a wise, healthful, and progressive sentiment in all matters relating to the general welfare. Magnificent cathedrals, consecrated to the name of religion, may stand in the midst of superstition, mental and moral degradation; colossal industrial enterprises may thrive upon the poverty and excessive toil of the multitude; but a nobly equipped institution of popular education is

the strongest possible evidence of wise public sentiment, free thought, and all the noblest possibilities of human character.

It is not expected that this book will serve as a collection of plans from which any particular design can be chosen, and executed without farther trouble or effort on the part of those to whom is entrusted the duty of planning and building the school-house. There is no royal road to knowledge of any sort, least of all to a knowledge of art, and the best architectural results can never be reached without special study for each building. Ready-made plans of dwelling-houses especially are of little value, for the reason that every man's house ought to suit his own character and circumstances. This is not true to the same extent of public school buildings. What is best for any one score or hundred of children of a given age will probably be best in all essential points for any other score or hundred with such changes only as will result from the use of different materials, variations in cost, and local modes of building. It will be understood that the floor-plans that are given do not necessarily require the exterior designs that accompany them, also that the dimensions of the rooms may be varied to suit varying requirements without changing either the general arrangement of the interior or the character of the design. A second story might easily be added to some of the plans that are drawn for but one, and the basement is always an alternative feature to be introduced or omitted according to circumstances.

It is hoped that teachers will find this book helpful in urging the rights of children, in explaining to building committees and others in authority the possibilities and the duties in regard to school-buildings. For after all has been said and done that can be said and done for other good influences, the welfare of the schools throughout the country is in the hands of the teachers. The future weal or woe of our country depends upon this devoted band of home missionaries.

TABLE OF CONTENTS.

CHAPTER I. PAGE

PREPARING THE GROUND AND OTHER ELEMENTARY WORK 1

A description of a log building of one room adapted to pioneer wants. Floor plan, two elevations, and details.

CHAPTER II.

TEMPORARY EXPEDIENTS 6

A cheap building of rough lumber, of same arangement as in Chapter I. Two elevations, floor plan, and details.

CHAPTER III.

A SINGLE ROOM WITH ABUNDANT CONVENIENCES 11

A country school-house of one room, with vestibules, porches, and fuel room. Floor plan, two elevations, and details.

CHAPTER IV.

A CHANGE OF GARMENTS 16

The same floor plan as in Chapter III., but with different exterior. Floor plan, two elevations, and details.

CHAPTER V.

ADAPTED TO A MULTITUDE OF CASES 19

A country school-house with cloak-rooms and porches. Two elevations, perspective, floor plan, and details.

CHAPTER VI.

ROOM FOR GROWTH 24

A country or village school-house of one large room, recitation room, lobby, and cloak-rooms. Floor plan and two elevations.

CHAPTER VII.

A DISCUSSION OF IMPORTANT OUTSIDE MATTERS 28

A building containing two school-rooms, with lobby, cloak-rooms, and porches. Floor plan, two elevations, perspective, and details.

CHAPTER VIII.

PAGE

A MODERATE GROWTH 33
A building of two rooms and recitation room, with lobbies, porches, and cloak-rooms. Floor plan, two elevations, and details.

CHAPTER IX.

A HIGHER PLATFORM 37
A school-house containing only one room, but of more elaborate exterior design. Floor plan and two elevations.

CHAPTER X.

A DISTINCTION WITH LITTLE DIFFERENCE 40
The same floor plan as in Chapter IX., but differently clothed. Floor plan, two elevations, and details.

CHAPTER XI.

FOR THE BEST FAMILIES 43
A building for a country or village school that varies in size at different seasons of the year. Floor and basement plans, elevations, perspective, and details.

CHAPTER XII.

RELATIVE DIMENSIONS 48
A wooden building with floor school-rooms, cloak-rooms, etc., with basement. Three floor plans, two elevations, perspective, and details.

CHAPTER XIII.

SAFETY IN WOOD 54
A wooden building with basement, six school-rooms, and hall. Three floor plans, perspective, and details.

CHAPTER XIV.

NOTHING TO GROW OLD 59
A building suitable for a village high school, with basement, five school-rooms, and hall, beside cloak-rooms, etc. Three floor plans, two elevations, and details.

CHAPTER XV.

THE VALUE OF THE BASEMENT 64
A one-story wooden building of three rooms. Two floor plans, two elevations, and details.

CHAPTER XVI.

PAGE

AN HONORABLE COMPETITION 69

A village or country school-house, built of stone, and containing one school-room, teacher's room, cloak-rooms, and high basement. Floor plan, two elevations, and details.

CHAPTER XVII.

A BODY OF STONE WITH MEMBERS OF CLAY 74

A building containing two school-rooms; the walls of stone, with terra cotta trimmings. Two elevations, floor plan, and perspective.

CHAPTER XVIII.

CHIEFLY CLAY 77

The same arrangement of rooms as in Chapter XVII. The walls being of brick instead of stone. Floor plan, two elevations, and details.

CHAPTER XIX.

SAFEGUARDS 81

A substantial stone building with high basement. Three school-rooms, cloak-rooms, etc. Two floor plans, two elevations, perspective, and details.

CHAPTER XX.

DESIRABLE FORMALITY 86

A building of two stories above the basement, each floor having three school-rooms. Two elevations, floor plans, and details.

CHAPTER XXI.

A CARDINAL VIRTUE 90

The same floor plan as in Chapter V., with a different exterior. Two elevations, floor plan, and details.

CHAPTER XXII.

MINOR CONCESSIONS 94

A brick building of two stories above the basement; each floor containing four school-rooms, cloak-rooms, etc. Two floor plans, perspective, elevation, and details.

CHAPTER XXIII.

ROOM FOR GROWTH 100

A two-story brick building with basement, each floor containing two school-rooms, cloak-rooms, and teacher's rooms; the whole arranged for future addition. Three floor plans, perspective, and details.

CHAPTER XXIV.

PAGE

CONCERNING ALTERATIONS 107

CHAPTER XXV.

CONCERNING VENTILATION 109

CHAPTER XXVI.

OUT-OF-DOOR SURROUNDINGS 114

Treating of playgrounds, front yards, entrances, gateways, fences, and other useful and decorative adjuncts.

CHAPTER XXVII.

DETACHED SUGGESTIONS 126

INDEX OF ILLUSTRATIONS.

	PAGE
Door-way for Log School-house	1
Division Fence of Logs	2
Floor Plan, Design A	2
Front Elevation, " "	3
Side " " "	4
Rough Fire Place	6
Front Elevation, Design B	7
Floor Plan, " "	8
Side Elevation, " "	8
Fire-place Screen	10
Detail of Frieze and Cornice	11
Floor Plan, Design C	12
Front Elevation, " "	13
Side " " "	13
Detail of Window Transom	16
Floor Plan, Design D	17
Front Elevation, " "	17
Side " " "	18
Detail of Chimney Construction	19
Floor Plan, Design E	20
Front Elevation, " "	20
Perspective " "	21
Side Elevation, " "	22
Detail of Stove Screen	24
Floor Plan, Design F	25
Front Elevation, " "	26
Side " " "	26
Front Elevation, Design G	28
Floor Plan, " "	30
Perspective, " "	31
Side Elevation, " "	31
Detail of Porch	32
" " Heating and Ventilating Flue	33
Floor Plan, Design H	34
Front Elevation, " "	35
Side Elevation, Design H	35
Details of Cornice and Cresting	37
Floor Plan, Design I	38
Front Elevation, " "	39
Side " " "	39
Detail of Eaves and Gable	40
Floor Plan, Design K	41
Front Elevation, " "	41
Side " " "	42
Fire-place	43
Front Elevation, Design L	44
Basement Plan, " "	45
Floor Plan, " "	45
Perspective, " "	46
Detail of Wardrobe	47
" " Truss	48
Perspective, Design M	49
Basement Plan, " "	49
First Floor " " "	50
Second " " " "	50
Alternative Second Floor Plan, Design M	51
Side Elevation, " "	51
Detail of Ventilating Turret	54
First Floor Plan, Design N	55
Second " " " "	56
Perspective, " "	56
Basement Plan, " "	57
Detail of Floor Construction	58
Terra-cotta Detail	59
Front Elevation, Design O	60
Basement Plan, " "	60
First Floor " " "	61
Second " " " "	61
Side Elevation, " "	62
Detail of Porch	64

	PAGE
Basement Plan, Design P	65
First Floor " " "	66
Front Elevation " "	66
Side " " "	67
Stone Detail	69
Floor Plan, Design Q	70
Front Elevation, " "	71
Side " " "	72
Belfry	73
Floor Plan, Design R	74
Perspective, " "	75
Front Elevation, " "	75
" " " "	76
Terra-cotta Dormer	77
Front Elevation, Design S	78
Floor Plan, " "	79
Side Elevation, " "	80
Stone Capital	81
Basement Plan, Design T	82
First Floor " " "	82
Perspective, " "	83
Front Elevation, " "	84
Side " " "	85
Cresting and Finials	86
First Floor Plan, Design U	87
Front Elevation, " "	88
End " " "	88
Inside Detail	90
Floor Plan, Design V	91
Front Elevation, Design V	92
Side " " "	92
Brick Detail	94
Basement Plan, Design W	95
First Floor " " "	96
Perspective, " "	97
Side Elevation, " "	98
Detail of Stairway	100
Perspective, Design X	100
Basement Plan, " "	102
First Floor " " "	103
Second " " " "	104
Fence for Playground	114
Broken Sky-line for Plain Fences	115
A Close Fence made of 1⅛-inch Plank Sawed at Top	115
Wooden Fence for the Front Yard	116
Iron Fence on a Stone Base	116
Wrought-iron Gate with Stone Posts	116
A Combination of Stone, Brick, Terra-cotta, Iron, and Glass	117
Stone Curb where no Fence is Needed	118
Sheltered Gateway and Seat	119
Dos-a-Dos	120
Sheltered Seat Resting on a Paving of Asphalt with Stone Coping	122
An Appropriate Gift from a Public-spirited Citizen to his Native District	124

TOWN AND COUNTRY SCHOOL-BUILDINGS.

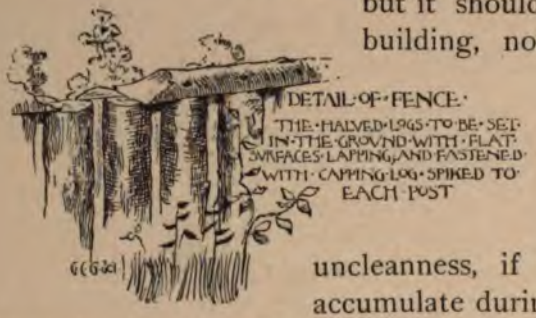
CHAPTER I.

PREPARING THE GROUND AND OTHER ELEMENTARY WORK.

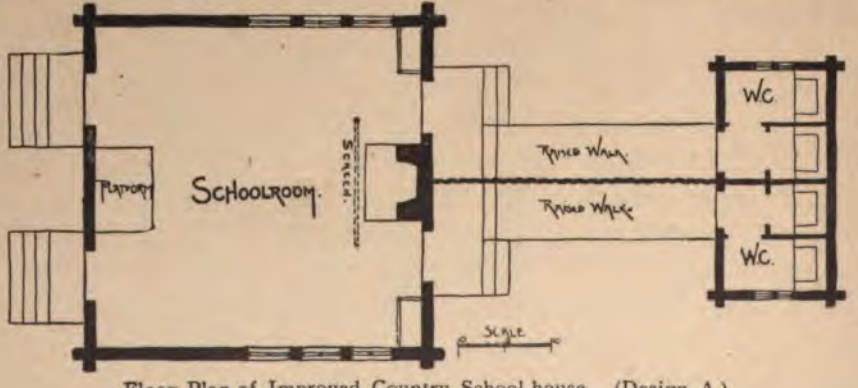
EVEN in frontier regions where only primitive resources are at hand, it is expedient in building school-houses to pay due regard to matters of taste, convenience, and health. The rawest kinds of raw materials may be put into artistic forms by thoughtful arrangement. Convenience does not depend upon complex machinery, and experience proves that the simplest precautions and expedients are of vastly more importance in sanitary matters than the elegant and elaborate devices that have come to be considered a part of modern civilization.

The single cell is the beginning of all school-houses, the germ from which all others are developed. Through whatever changes of complicated growth it may pass, it is the same in kind and purpose, one room large enough to hold from twenty to fifty children in the care of a single teacher. This building has no cellar, because it would have no use for one, but the preparation of the ground on which it stands is of the first importance. The sods, roots, stumps, and perishable matters of all kinds must be thoroughly removed. And after this is done, the surface covered by the building or enclosed by its

foundation-walls must be several inches higher than the ground outside. In a region where there are deep snows in winter it should be not less than a foot higher. The common custom of making an excavation in order to secure an air-space under the floor-timbers is most unwise. The air-space is all right provided it is well ventilated, but it should be obtained by raising the building, not by sinking the ground. There is no more active cause of sore throats, diphtheria, and pneumonia than the pools of melting snow mingled with the inevitable uncleanness, if not positive filth, that will accumulate during the winter around and under a district school-house. To excavate underneath a building even for the purpose of removing materials liable to decay, and then refill the excavation with sand, would not insure either dryness or cleanness, if the nature of the subsoil is such as to hold water, because the space between the walls is still a basin in which the sand lies like a wet sponge from which hurtful emanations may arise longer, perhaps, than if it had not been filled with sand.

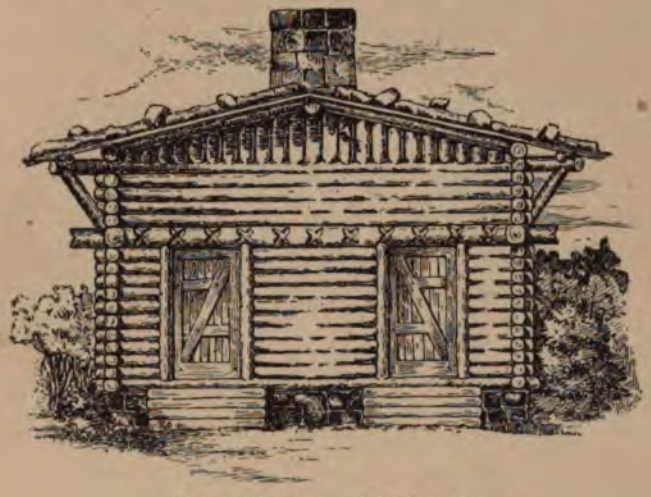


In making provision for dryness, there are two sources of danger to be taken into account: the dampness which comes from a naturally



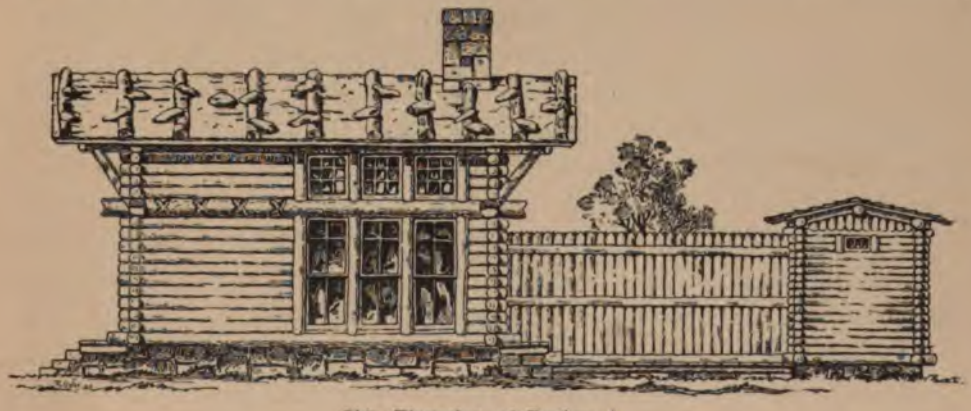
Floor Plan of Improved Country School-house. (Design A.)

wet soil, that is, a soil which is rarely if ever dry on account of underground springs, or leaching from higher ground; and the



Front Elevation of Design A.

temporary moisture to which all land is subject from rainfall or melting snow. From whichever cause it arises, there must be absolute



Side Elevation of Design A.

protection from this ground-moisture. In the former case, that is, the chronic dampness, if such land must be occupied by a

building, the least precaution admissible is a drain entirely around the building at the foot of the foundation-wall, having a steady fall to some outlet that will always be open. This will prevent a stagnant pool of water in the earth and keep the bit of land covered by the building comparatively dry. This drain may be of common agricultural tiles, where they can be obtained, and where they cannot, small stones thrown into a trench and covered with fine brush before the earth is filled in will answer.

To prevent surface water, rains, and melting snow from accumulating under and around a building it is necessary that the surface of the ground should slope rapidly away from it in all directions. In a small, if not in a large way, every school-house should be set on a hill, not only that its light may shine, but that the children's feet may be dry. If they must choose between clean hands and dry feet, let them have the dry feet. In a level country where there are no natural hills, a hill must be made. It is not a serious fault to set a building upon stone or wooden posts if close economy requires it, leaving the space underneath entirely open. The most obvious objections to this are the ugly appearance of the building perched upon stilts, and the difficulty of keeping warm in cold weather. It will also be necessary to protect the ground underneath from the marble-pits and other earth-works of the small boys, by a paving of concrete, bricks, or cobble-stones. It would be more satisfactory to set a strong wooden lattice between the posts, which may be rough and cheap, but should be very substantial, and put together with screws instead of nails.

I have shown this primitive cell with a solid-looking stone underpinning, assuming that it is built in a region where rocks and forests both abound, and will cost nothing but the labor of getting them. If it should happen that labor is the most valuable of all the elements that enter into its construction, it may be objected that there is a needless outlay upon this simple building; yet the only difference between this and the baldest structure possible is in the use of one tier of larger logs at the height of the top of the doors, one side of which has

been gashed with an axe, and the few feet of extra length in the logs that support the overhanging roof.

The details of construction for such a building I shall not attempt to describe. An actual pioneer who has learned wisdom and invention in the best of all schools, experience, would laugh at my rules, but I shall not yield an iota of my opinion that it is the truest wisdom and the closest economy to give even to the primitive buildings that are devoted to educational purposes, some visible evidence of thoughtful study in their external appearance, some sign of honorable regard, and to the preparation of the ground on which they are to stand at least as much care as a wise gardener would give to an asparagus-bed.

CHAPTER II.

TEMPORARY EXPEDIENTS.

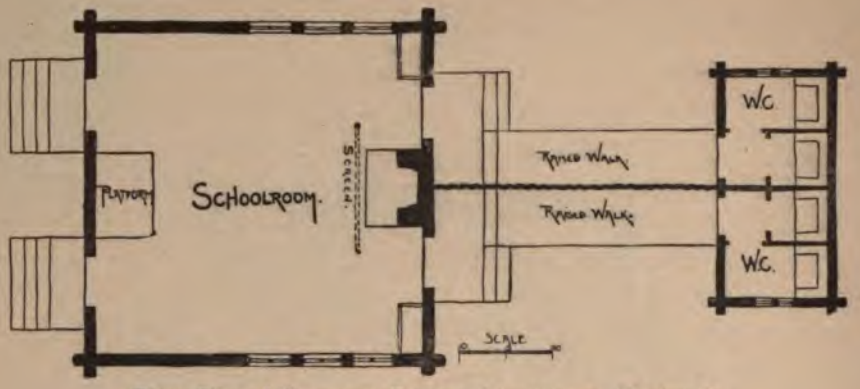
THIS is a design for the same primitive structure, but in regions where the saw-mill is the prompt attendant, if not the precursor, of that permanent settlement of the country in which schools have their growth. Labor is still the most precious of the materials that are required, and a structure that can be built as Rome was not, in a day, is the most suitable, and perhaps the only available one. This is made on the mollusk plan ; that is to say, the skeleton is on the outside. In the utmost economy of raw material this would not be the wisest method, for there is somewhat more liability to decay in this case than when the frame is protected in the ordinary way by the outer covering. But it has the advantage of finishing the interior neatly and at once, and of giving a more attractive-looking exterior, while still leaving the building in such condition that it may at any future time be completed in the most thorough and durable manner. In both these designs the windows are grouped to form the large single side-light. There is a question whether the light should be admitted from both sides or from the left of the scholars only. In small country buildings it generally seems more satisfactory to have the windows on both sides of the room, and provide shades or shutters for one side if there is too much light, or trouble from cross-lights. Whether from one or both sides, groups of windows cost no more

Front Elevation of Design B.

than smaller detached openings. Of course the sizes of the panes of glass must be left to circumstances. Indeed the pioneer school-house may be thankful if it has glass in its windows at all; nor would it be such a serious deprivation if it should be thrown back upon the old substitute, oiled paper. The time seems to be fast approaching, not exactly when "all the land will be paper and all the seas of ink," but when everything needed for the necessities of men, except food and drink, will be made of that artificial material which adapts itself so readily to a constantly increasing variety of purposes.

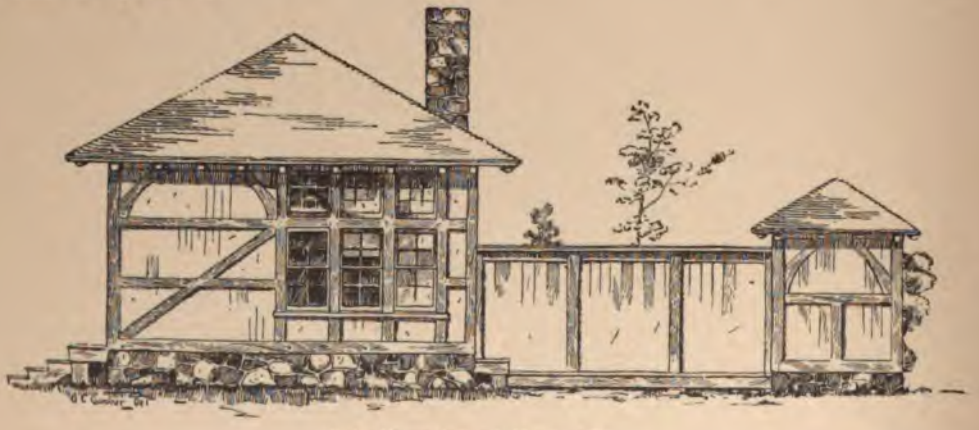
There are strong water-proof papers that are semi-transparent which would make excellent temporary substitutes for glass, and roofing and sheathing papers that will keep out the rain far better, and I am not sure but longer, than the cheap, sawed shingles of half-decayed lumber which find their way into the markets. Being light in weight, the transportation of paper beyond the lines of the railways will not be a difficult or expensive matter.

Neither of these simple plans provides for cloak-rooms, vestibules, or any other of the numerous conveniences that are expected in the fully developed building. The fireplace is the only means of warm-



Floor Plan of One-room Country School-house (Design B).

ing, and that, with the opening of doors and windows, furnishes also the crude but none the less effective ventilation. Although as regards the latter, structures of this primitive kind will not lack ample breathing-spaces through the cracks and crannies between the logs or rough timbers of which it is composed. In the matter of fresh air our forefathers, in the days of wigwams and log-cabins, builded better than they knew.



Side Elevation of Design B.

Large bins at the rear corners of the room will hold the day's stock of fuel, and the outer wraps of the children will hang against

the wall at either side of the teacher's platform. Concerning the furniture it would be useless to prescribe, for necessity will dictate what it shall be : whether slab seats in long rows, home-made chairs, or ready-made furniture. Only one thing must be insisted upon: the seats, whatever they are, must have backs. It may be possible to teach one child, or possibly half a dozen, to sit upright several hours in the day by sheer force of back-bone, and those who are thus trained will have a great advantage over those who depend upon a back-board —that is, if they survive the training; but it is scarcely possible that a whole school of boys and girls of all ages and of every variety of physical constitution can be kept from serious injury if compelled to maintain a perpendicular position during the study hours without substantial support. A single pole with the bark on, if need be, would be far better than nothing. Of course the backs of the pupils sitting next the big fireplace when it is in full blast, as it must be in cold weather, would soon be roasted to the spine if unprotected; but this difficulty, which is inseparable from the use of the fire-place, can easily be overcome, and the fire made far more effective in warming the room, by a very simple expedient, if the school-house is not more than a thousand miles from a tinshop. Whether there is glass in the windows or a latch on the doors, there must be in front of the fire-place a screen, covered on the side next the fire with bright tin. This should be just high enough to thoroughly screen from the heat the heads of the tallest boys sitting in front of it, not high enough to hide the shortest one standing behind it, and twice as long as the width of the fireplace. It should not stand vertically before the fire, but should tip backwards a few inches, so that the reflected heat from it may be thrown upward. Then if the air in the room conducts itself as air ought in such circumstances, it will rise to the ceiling, pass across to the teachers' end of the room, and gradually fall to the floor, giving a fairly uniform temperature to the apartment.

In regions where the winters are severe, such a building should always have a south frontage. If it must be placed on a street that runs north and south, it would better stand broadside to the road for the sake

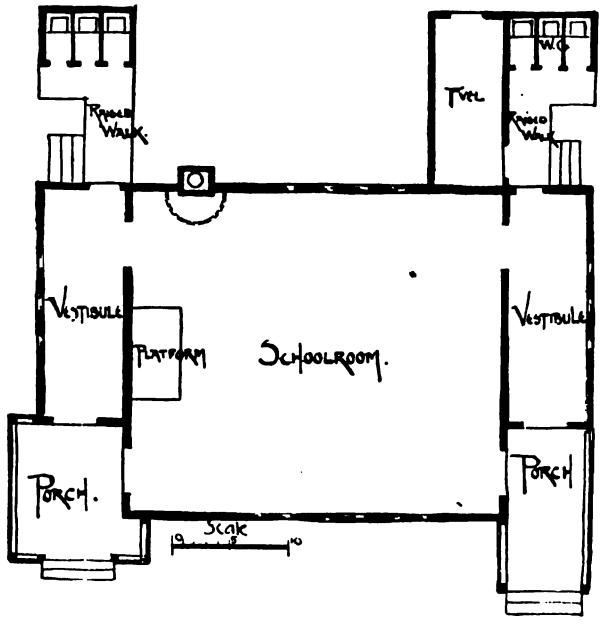
of the southern outlook than to open its doors to the northeast storms or the cold northwest winds. Beyond these suggestions the plans require no explanation. They are at best but temporary expedients, willing to be superseded by more complete accommodations as soon as the facilities for building will justify them. The chief point is that the school-house, even in its most rudimentary condition, shall be an object worthy of affection and respect, and always in advance of the general conditions by which it is surrounded; since it is in fact the special mission of the common school not merely to point out the way of wisdom and progress, but to lead in that way.

CHAPTER III.

A SINGLE ROOM WITH ABUNDANT CONVENIENCES.

THIS plan is a degree beyond the first two, though a single cell. It has porches, one for the boys and one for the girls, under which the super-punctual who reach the school-house before the doors are unlocked can find shelter on stormy days; and it has the vestibules which remove the objection to opening the outer doors directly into the school-room, and in which, if it is thought expedient, the children can leave their outer wraps in cold weather, and their hats and caps at all times. Otherwise it is substantially the same thing as its predecessors. It is, however, supposed to be finished in a more thorough manner, as it stands in a region where all the common means and materials for building are to be had and there is no obstacle in the way of the most complete and highly developed structures except the want of money to spend for them. This, by the way, is not half so common a difficulty as we are apt to be assured. It is one of the unaccountable things that men who have had the advantages of a common-school education should appear to be stupidly ignorant of the simplest processes of arithmetic and common-sense when the question of building a new school-house is before them. Men who do not hesitate a moment when their children need a pair of boots and shoes all around, or new suits of clothes, a few dollars for a pleasure-trip, or for far more unnecessary purposes, will groan and grumble and throw all possible obstacles in the way of erecting a

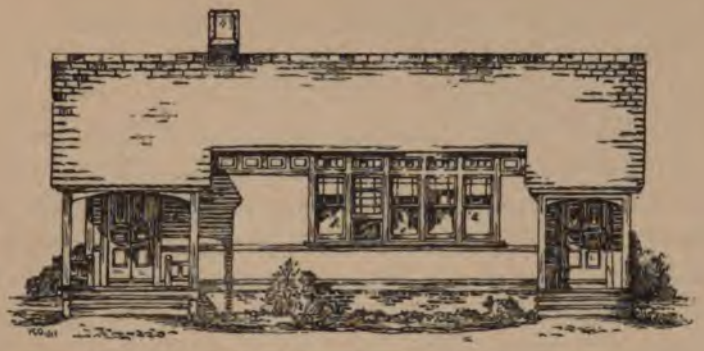
building for their own especial well-being and comfort: and all for no earthly reason except that it must be owned in common and enjoyed with one another. In fact, it would be a most extraordinary thing to find in this country a community in which half the money spent for rum and tobacco, to mention no other useless expenditures, would not in five years build a school-house that would be, in comparison with all other structures in the neighborhood, a model of utility, comfort, and elegance. I presume even those who hold that these debatable



Floor Plan of One-room Country School-house. (Design C.)

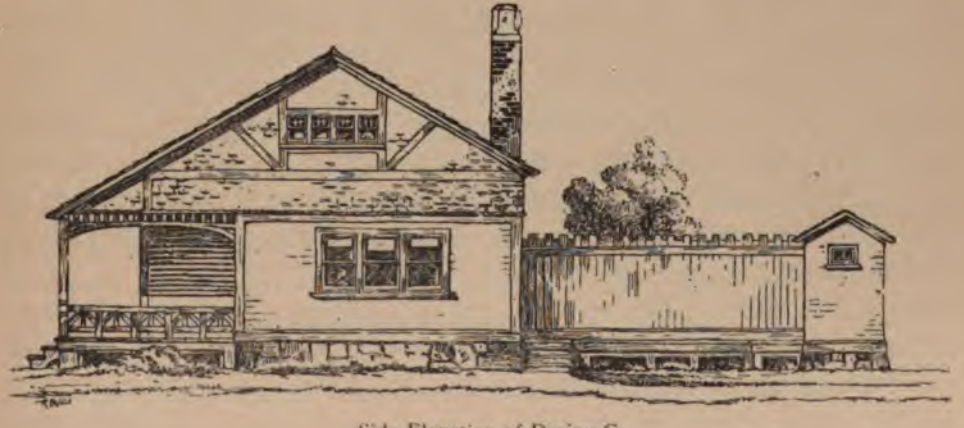
and much debated luxuries are actual necessities to the male half of mankind will admit that at least one half of the money spent for them might well be devoted to educational purposes, at least for a term of five years—after which there would be no further need of such self-denial during that generation, for a well-built school-house ought to serve its purpose for that length of time at least.

This also gives evidence of progress in the substitution of the stove



Front Elevation of Design C.

for the fireplace; for though there is much to be said in favor of the more primitive mode of heating, and a great many forcible objections to the stove as commonly used, of the two the stove is by far the more scientific mode of heating—the more scientific and therefore the more economical. Ignorantly or carelessly managed, a cast-iron stove in a school-room is a means of torture, if not of an actual slaughter of the innocents, "burning the air," scorching those who have the misfortune to sit near it, and leaving the more remote to become slowly chilled in body and mind; a noisy, dirty, uncomfortable intruder. But when intelligently treated it becomes a reasonable and faithful



Side Elevation of Design C.

servant, giving larger returns in the way of heat for what it receives in the way of fuel, four times over, than the more attractive and wasteful fireplaces of our fathers.

A stove to be an agreeable means of warming any large room should in all essential respects adopt the principles of a hot-air furnace of the best construction and arrangement; that is, fresh outside air must be brought to it as rapidly as it can be warmed, and quickly diffused through the room. This need not be done by means of long, slender tin pipes and cast-iron registers. The same results may be accomplished by surrounding the stove with a non-conducting case or jacket of sheet-iron which will prevent the direct radiation of all the heat from the stove into the air in its immediate vicinity, and then arranging for the admission of fresh air from out of doors through the floor under the stoves. This will lift the air around the stove, as fast as it is warmed, to the top of the room, where it will be much more quickly and uniformly diffused than if the heat of the stove is allowed to radiate in all directions. To insure this diffusion of heat a steady circulation of air must be constantly maintained, and that can only be accomplished by means of an exhaust-flue having its inner opening at the floor near the stove. In this case it might start from the front of the teacher's platform, and thence pass under the floor to the ventilating-flue in the chimney, which, being always warmed by the heat from the smoke-pipe, will have a strong draught. The ordinary mode of saving heat by making a long pipe in the room is a foolish waste of resources. This heat should be devoted to ventilation. It is a common remark that the open fireplace, with all its loss of heat, is good economy because it ventilates so completely; but like all unscientific modes of accomplishing a desired end, it is extremely wasteful. It does indeed ventilate in its immediate vicinity, where perhaps ventilation is least needed, and by a great waste of fuel. The same amount of heat maintained in a ventilating-flue arranged to effect a change of air in a systematic way would be vastly more effective. The great practical difficulty arises from the possibility of using a stove without the saving arrangement for ventilation,

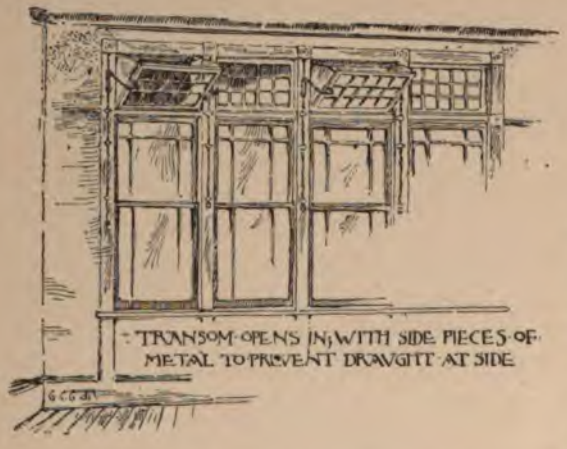
and then it becomes an engine of destruction. Let it once be distinctly understood that the large ventilating-shaft warmed by the heat from the stove-pipe, and the exhaust-flue from the floor, are as necessary as the windows, the doors, and the roof, and we shall hear no more complaints of illy ventilated country school-houses.

It would be an open question whether to have the direct doors from the school-room to the porches; they would be kept closed in the winter, but in warm weather, especially for a primary school, they would be desirable, all the more so as there are no separate cloak-rooms or closets, and the scholars might be required to hang their hats on the walls of the school-room, in which case there would be no occasion for them to pass through the vestibule either in coming in or going out.

The mechanical construction of this building is about as simple as it could be made. A plain gabled roof, the slope of the front side brought forward at the ends to cover the little porches. The frame a "balloon," the outer covering common siding or "clapboards," as they are called in some parts of the country, except the gable ends above the lines of the tops of the windows, where shingles are used. I would not advise shingles on the lower part of the walls. They offer too many salient points to the national jack-knife. It is true, boys must be taught to hold the visible temples of learning in profound respect. It is an essential part of their education to refrain from whittling the school-house and tearing their own clothes; but up to a certain point it is best to keep temptation in those directions as far off as possible. There is no objection to shingling the gables for the sake of variety in the external appearance. The work about the porch is plain and solid. It has been suggested that the porch-rail ought to be covered with sheet-iron or spikes. If boys were colts, that would be necessary; being boys, it is not. Doubtless they will sit on it, and jump over it, and crawl through it; but if it is well painted, or made of hard wood and finished with some of the varnishes that are used to preserve unpainted wood in exposed places, it will not require any other protection.

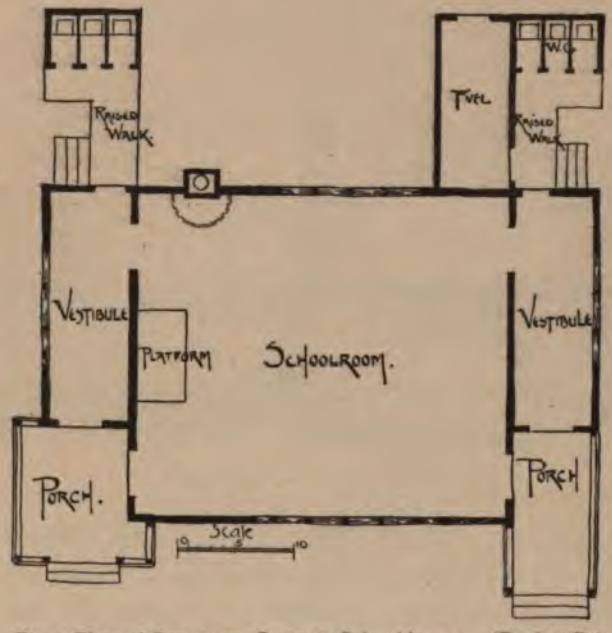
CHAPTER IV.

A CHANGE OF GARMENTS.



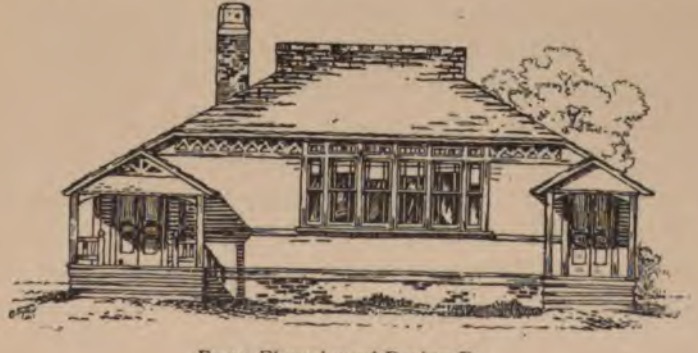
THIS is the same plan in a different suit of clothes. The roof is hipped and somewhat more broken in outline than the other, though there would be little if any difference in the cost of the two buildings. The school-rooms are of the same size and height, and are precisely alike in their arrangements and accommodations. In this, the ceilings of the vestibules are two or three feet lower than that of the main room, on account of the slope of the roof. Neither of the buildings would have a "high look;" but this is the more humble of the two, and, therefore, the more suitable for the top of a high hill or any other location where it is desirable to keep the building as inconspicuous as possible. The top of a high hill, however, is not the right place for a school-house or any other building except a castle, a tower, or a monument. Neither of the buildings has a cellar; but there is an attic or loft, accessible only through a trap-door in the ceiling. This attic is ventilated by the small windows in the gables, which are opened and closed by cords from the school-room, and the trap-door is constructed to serve as a hot-weather ventilator, by which I mean the natural ventilation that takes place when the heated air in

a room is allowed to rise freely through the roof This is the most effective mode of changing the atmosphere of a warm room. It does



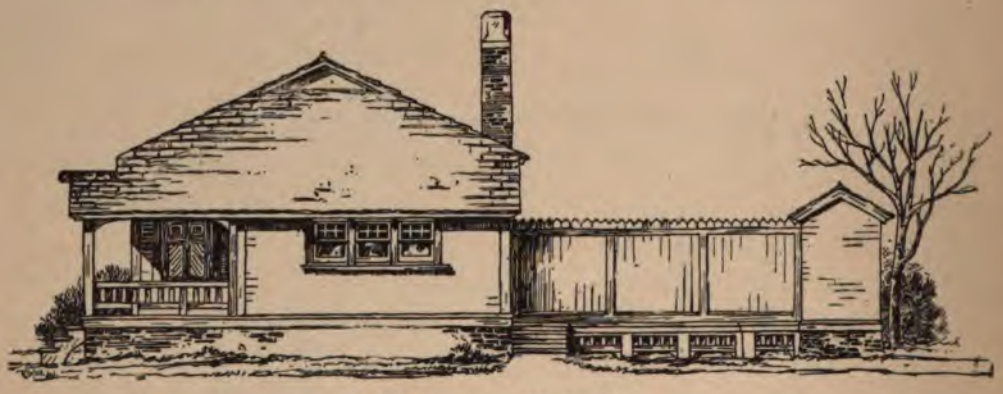
Floor Plan of One-room Country School-house. (Design D.)

not produce the dangerous draughts that result from opening the windows, and in warm weather the escape of the heat with the foul air



Front Elevation of Design D.

is not a loss, as it is when heat costs fuel. The chimney which belongs to these plans contains both the ventilating and smoke flues, the former being of bricks, twenty-eight inches square, and the latter a thin cast-iron pipe placed in the centre of the ventilating-flue.



Side Elevation of Design D.

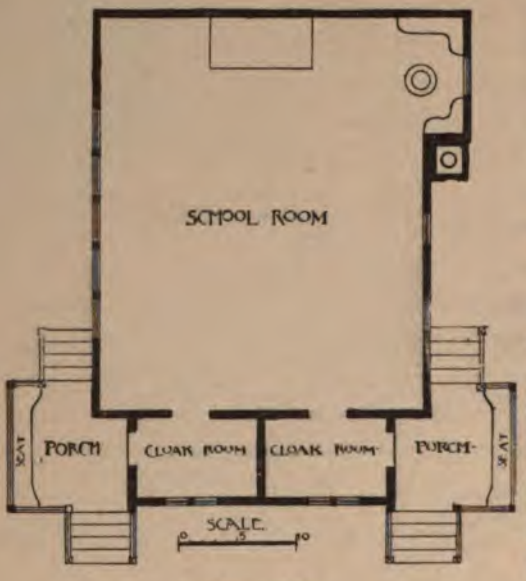
A close economy in building would dispense with the transoms over the group of windows, making the sashes in two parts only. Aside from the better appearance, the transoms, if they are made to open inwards from the top, furnish the best means of window-ventilation and leave the lower sashes, which are hung by weights, of more convenient size and shape than if they extended the full height of the opening.

CHAPTER V.

ADAPTED TO A MULTITUDE OF CASES.

THIS is for a small village or country school where there is need of close economy, but where there are ample facilities for obtaining the best results without large expenditure. Its chief variation from the preceding plan is in the location of the vestibules, which are at what is probably the front of the building as regards the street or highway on which it stands, but are in fact at the rear of the school-room itself. The stove, too, has a place prepared for its especial accommodation; which is a matter of much importance, but almost invariably disregarded. Those who have attended a country district-school in winter will remember the formality of "going to the stove," during the session, and the opportunity afforded for surreptitious gossip and other roguery, and the tumultuous crowding around the source of warmth on zero mornings before school "begins." It is evident that this part of the interior arrangement should be carefully considered, not only as a matter of health and comfort, but of school discipline.

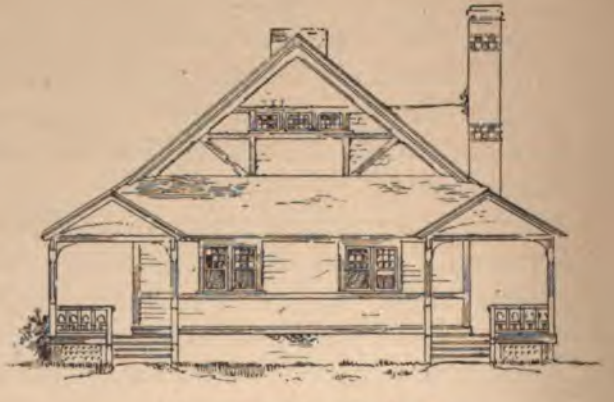
Where, for economical reasons, it is impracticable to have but one warm room for the use of the school, and that the room in which all are assembled for study and recitation, it is not enough that this should be uniformly warmed to a proper temperature; there should also be opportunity for those who arrive at the building cold and wet, to warm their hands and feet and to dry their clothing. The chief



FLOOR PLAN.

One-room Country School-house. Design E.

objection to enclosing the stove, which stands in the room, with a close screen or jacket eight or ten feet high (fresh outer air being admitted through the floor underneath it, as described on page 14), is that this makes no provision for the needs described above. The enclosing screen will not be sufficiently heated to warm and dry quickly the chilled hands and feet of the children. To make openings in the side of it near the floor, would to a great extent prevent its successful working in warming the atmosphere of the room, besides complicating the apparatus and increasing its liability to get out of repair. Every heater of this kind ought therefore to have a portion of its surface arranged to furnish a direct radiation near the floor. This should not be large enough or hot enough to make the adjacent seats uncomfortable, but sufficient to be very sensibly felt by those standing near it. The object might be admirably accomplished



Front Elevation. Design E.

by attaching hot-water circulating pipes or radiators to the stove, and by placing them outside the jacket to be warmed by a "water-back" similar to the fixture used in kitchen ranges for heating the bath-boiler. The first cost of this would be comparatively slight, and it would give precisely the means of health and comfort desired. The obvious objection is that it would require emptying every night on account of

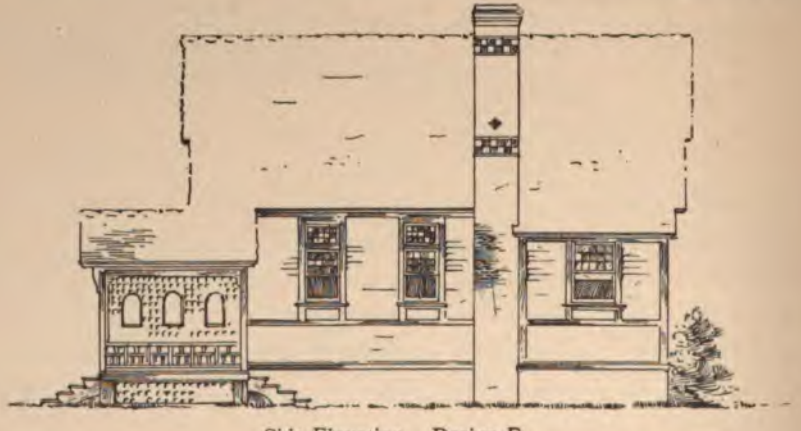
Perspective View. Design E.

the danger of freezing. This would not be in fact a serious trouble, if it were once understood to be a matter of necessity.

In order to avoid encroaching upon the space required for the seats and desks, an alcove is built out at the left of the teacher's platform. It would be more convenient for the scholars, especially for those who come in late, if it were near the door; but the wall-space at that end of the room is desirable for blackboards, and there are excellent rea-

sons why the stove and the group of children that will sometimes gather around it should be near the teacher. Which situation can urge the stronger claims is perhaps a question for the teachers themselves to decide. At least some of the grounds for argument would rest upon the discipline of the school. By making a slight change in this plan, a little space could be borrowed from the lobbies, making a recess between them where the stove would have the advantage of being near the door; the unpunctual could creep quietly into the room, hide behind the stove for a time, and possibly gain their seats without being detected in their tardiness.

This plan might be still further modified by the omission of the porches, either leaving the doors without any protection or substituting for them plain hoods. The doors themselves could be left where they are, or they might be brought around to the front of the projection that contains the lobbies. Porches, however, are an important adjunct to any school-house which is not provided with an open basement or other large ante-room. Far better is it that they should be as rude in construction as the sheds which a prudent farmer provides for his cattle and sheep, than that the children should be left without this provision for their comfort and enjoyment. For the teachers, and for all the children, they



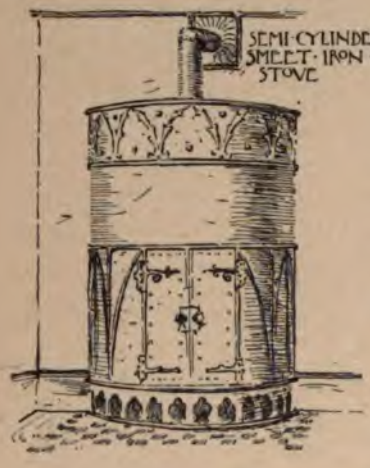
Side Elevation. Design E.

afford shelter from storms and from the hot sun; while the less robust, who are inclined to stay indoors at recess or during other regular intermissions, are tempted by them into the more healthful outside air.

Still another indirect reason might be urged for retaining the porches,—their value as an example to be followed by existing buildings. There are innumerable school-houses, new and old, that would be completely changed, as regards their external appearance, by the addition of ample porches;—changed for the better;—and the cheaper, more unpretending the original structure, the less would be the cost of the addition, and the greater would be the transformation.

CHAPTER VI.

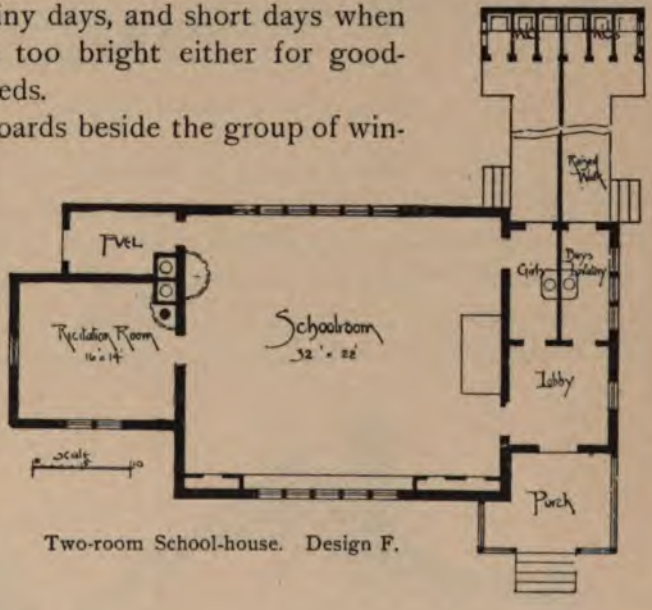
ROOM FOR GROWTH.



IT sometimes happens that the children of a single district can best be organized as a single school with two teachers, rather than as two separate schools, each with a room and teacher of its own. In such cases, there should be a recitation-room annexed to the main room. This plan is for such a school. It differs from the other single cells in having one common entrance and lobby for the entire school, from which open the separate cloak-rooms for the boys and girls, the latter communicating directly with the school-room. Like the other plans, this is warmed by stoves treated in furnace-fashion; an exhaust-flue having an area of at least five square feet, passing from the teacher's platform under the floor to the brick ventilating-flue that surrounds the iron smoke-pipe. Fresh air is brought into the chamber around the stove by a cold-air box opening directly out-of-doors, the inner opening protected and regulated by a register under the stove itself.

In this plan, too, I have shown windows on both sides of the room. Although not according to the strictest theories, this has certain advantages which should not be overlooked. If the eyes of the pupils were at all times directed to their books lying on their desks before them, a single light over their left shoulders would be all that is required. Light from any other quarter would not only be unneces-

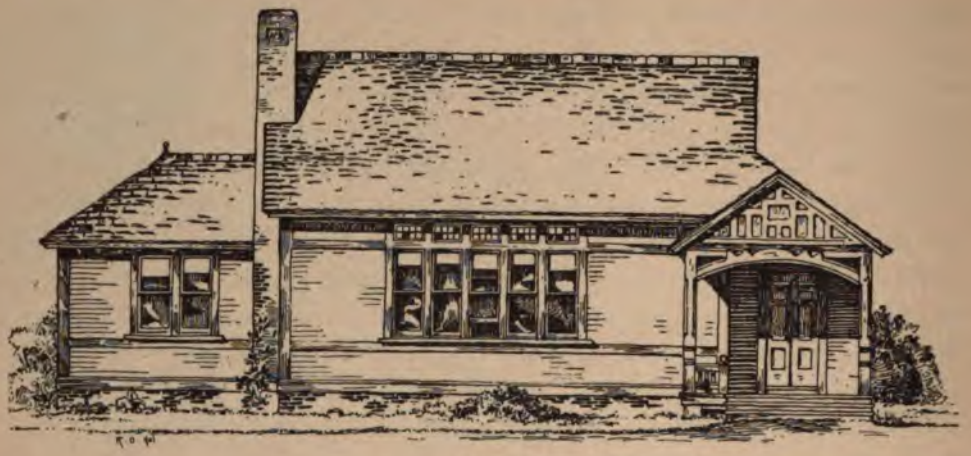
sary but objectionable. When their attention is directed away from their books, as it often is either to their teacher's desk or to the blackboards that may extend entirely across both ends of the room, and during all general exercises of the school, it is of little consequence where the light comes from, provided there is plenty of it. The advantage of having an abundance of light even for rare and special occasions, far more than offsets the extra cost of blinds for the windows that are not usually needed. In other words, it is better to put in twice the number of windows that are necessary, and close one-half of them during the regular study-hours. There are gloomy days, dark rainy days, and short days when all out doors is none too bright either for good-cheer or for actual needs.



Two-room School-house. Design F.

The shallow cupboards beside the group of windows at the front side of the main room, for a small school-library or other apparatus, form a wide recess which may be filled with a window-seat, and the jambs afford sufficient space for the folding of inside blinds. The boys and girls are given but one porch and vestibule, but separate cloak-rooms.

The fuel-room is not expected to contain anything but fuel; this will be put in from the outside, and once filled, will not be accessible except from the school-room, with which it communicates directly. If the building stands with porch to the south, the window-seat may be filled with flowers, and it would be well to leave a wider space between the seats and this side of the room than at the opposite side.



Front Elevation. Design F.

The civilizing influence of flowers in the school-room is very great. They give the keenest pleasure to many children, and even those who appear to be indifferent to them, or who are inclined to ridicule them, are insensibly affected by their presence. There is nothing more easily obtained, they ask but the slightest care, and they serve as excellent indicators of the sanitary state of the atmosphere as regards

Side Elevation. Design F.

dust and dryness. When the room is too dry and dusty for plants, then it is unfit for children. If a sunny window-seat cannot be spared, it is easy to have in any shaded corner boxes of native ferns. It should go without saying that whether ferns, wild flowers, or exotics are cultivated, ignorance of their names and something of their habits would be as disgraceful to the members of the school as the inability to give the geographical boundaries of the state in which they live, or to name its principal exports.

CHAPTER VII.

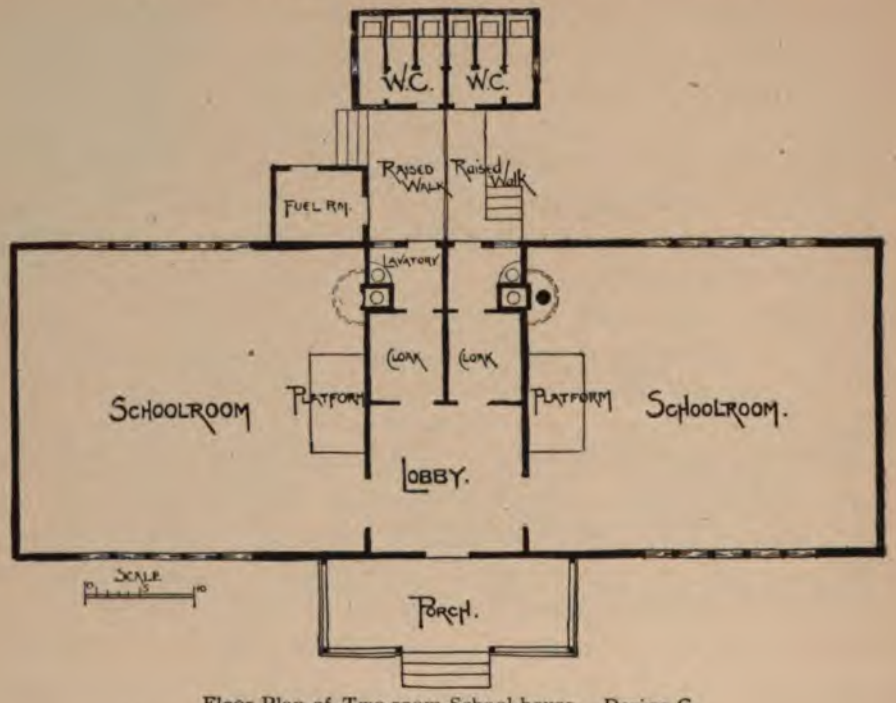
A DISCUSSION OF IMPORTANT OUTSIDE MATTERS.

Front Elevation. Design G.

THIS design is for a school-house of two rooms, with a single large vestibule for both, and two cloak-rooms, one for the boys of both rooms and one for the girls. Such a building would be suitable for a school so nearly homogeneous that it is practically one school divided into two equal portions, or one in which the assistant has a room precisely like that of the principal, and where the classes may be transferred from one room to the other as occasion requires. In its general arrangement it is precisely like the single-celled rooms; it has no cellar and is warmed by the stoves standing near the teacher's platform in the corners of the rooms, surrounded by non-conducting guards, supplied with fresh air from outside and each room having a large ventilating-flue, warmed in cold weather by the heat from the smoke-pipe. The partition between the boys' and girls' cloak-rooms should extend the full height of the room; but those separating the cloak-rooms from the lobby and from the lavatories are simply screens six or seven feet high.

This building has also a similar arrangement for the privies or earth-closets that has been shown in former plans. They are directly accessible from each cloak-room or lobby as well as from the play-ground, and not one jot or tittle of the completeness of their arrangements should be abated even from the simplest and cheapest of the buildings. It would doubtless be better on some accounts to have two detached outbuildings instead of one, as shown in Chapter III., with walks quite separated; but in other respects the arrangement shown on this plan is more convenient, and after taking into account the cost of a substantial and perfectly impervious barrier between the two, it is decidedly more economical. In case of the two separate buildings and walks, the space between the two need not be accessible either for the boys or girls as a part of the playground, but may be kept clean and free as an open ornamental lawn.

It may be thought that these privies are shown too near the main school-room. This is not the case, (although they can easily be set farther back), because there is no difficulty in keeping them in such condition that they shall be inoffensive; while if they are more remote they are almost sure to become intolerable nuisances. Decent privies, kept in decent order, are absolutely indispensable to the physical and moral welfare of the children; and if they cannot be afforded by any other means it would be far wiser to discontinue the schools for a whole year and expend the year's appropriation in providing such accommodations as are requisite, rather than to allow these necessary adjuncts to remain in the condition in which they are often found. I am sure that no apology is due for dwelling at length upon this subject, for it is certain that they are not infrequently in a barbarous condition ; as a matter of fact, decidedly worse than barbarous. To say that they are beastly would be unfair to the beasts ; they are worse than beastly. It is not, however, such a difficult or expensive matter to secure decency and cleanliness as is usually supposed. As regards offensive odors, it is only needful that the vaults should be kept perfectly dry all the time, and this condition of dryness is easily maintained. Dry earth is cheap everywhere, except in the Great Dismal Swamp, and



Floor Plan of Two-room School-house. Design G.

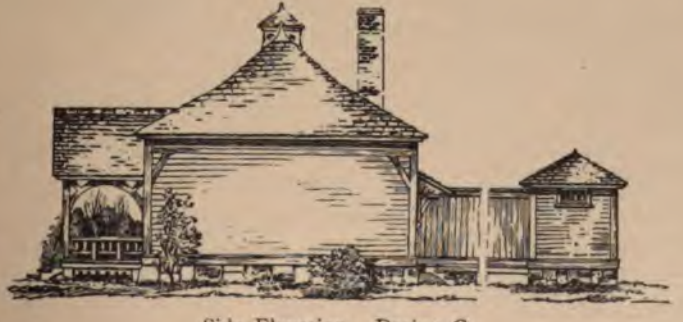
coal ashes are commonly a drug where coal is the common fuel. Either of these materials is efficacious as a disinfectant. For a school of forty or fifty children, the proper care of the privies would involve less actual labor and expense than the care of a single domestic animal, horse, cow, or pig; or, if his food is taken into account, the average dog. Are not the children of more value than many dogs?

To the objection that such careful provision for the comfort and well-being of the children is more than many of them are accustomed to at home, it may be replied that parents who do not in this progressive age desire better conditions for their children than they themselves enjoyed, who do not desire that they shall be better bred, better educated, better developed in all respects, have no right to dictate what their training shall be; much less the training of their neighbors' children, which, in the nature of the public school, must be the same

Perspective View. Design G.

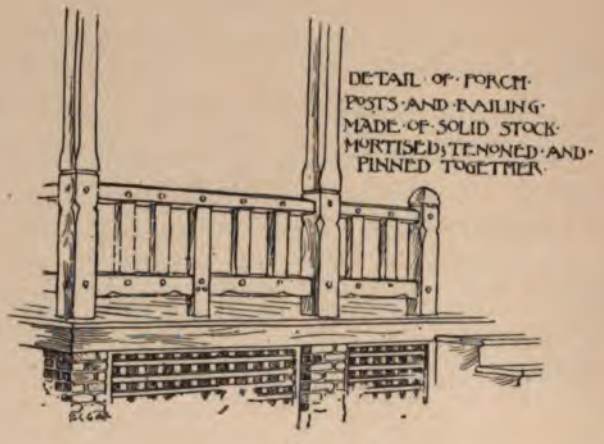
as that of their own. I have discussed this subject in connection with this smaller building, because with such it is most likely to be neglected; and only in reference to earth-closets, where a water system is out of the question.

I am fully persuaded that habits of cleanliness, decency, and good order are the most essential points in the secular education of children whether at home or in school. I will not even except industry; for without these qualities industry itself is wasted, or, like idleness, enters into the service of Satan. It is evident that these accessories can be omitted without any essential change of the main building, but some one else must take the responsibility of such omission; it must needs be that offence will come, but woe unto him by whom it cometh.



Side Elevation. Design G.

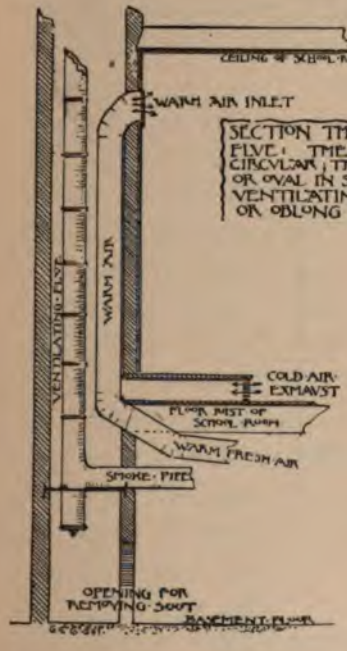
If the truth were known, I think it would be found that the lack of proper accommodations in this direction, and the attendant evils, moral and physical, have more to do with the withdrawal of the "better class" of the pupils from the public schools, of which we sometimes hear complaints, than any question as to the excellence of the literary instruction or the general discipline of the school-room. Of course all the fittings and fixtures of these privies should be of the plainest, smoothest, most durable kind. This is the first condition of decency; the second is eternal vigilance on the part of the teacher.



NOTE.—The subject of school out-buildings is admirably treated by Mr. H. R. Sanford, in Chap. V. of the book of designs, recently published by the Department of Public Instruction of the State of New York.

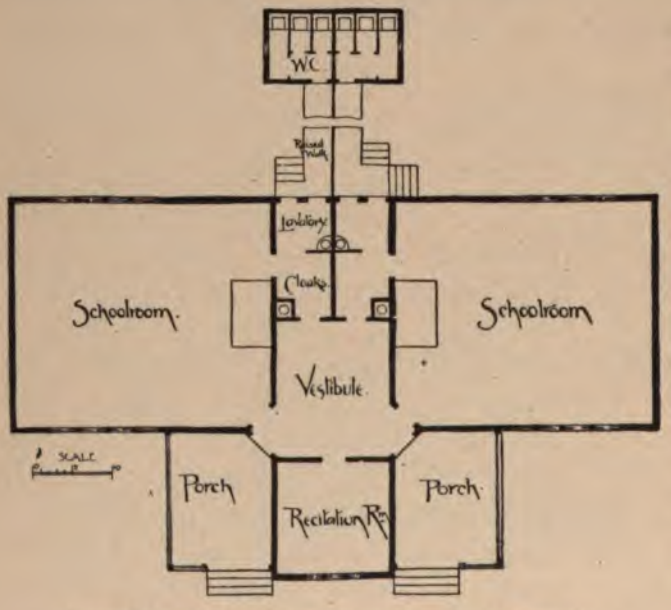
CHAPTER VIII.

A MODERATE GROWTH.



THIS is simply a variation of number six. It keeps the common vestibule, and has but the two cloak-rooms for both schools; but it has two porches and outside doors, and an additional room for recitations. It has, moreover, a cellar, and is warmed by a furnace that will stand directly under the vestibule. This does not require a cellar under the entire building but only under the central part, that is, the vestibule, recitation-room, and cloak-rooms. The fuel would be put in under the recitation-room from the front, and the entrance to the basement would be from the outside of the building at the rear, the furnace being cared for by a janitor who will have no occasion to enter the building during the session of the school. There is still some difference of opinion about the introduction of warm air from a furnace; but the most generally accepted theory is that the best results are obtained by carrying the furnace-pipes well up the walls of the rooms, at least two-thirds of the height, and then, by means of a large, warmed flue, exhausting the cold air from a place near the floor and nearly under the spot where it enters. By this arrangement, the

warm air, which is sure to rise directly to the top of the room, will pass across the ceiling, descend to the lower part of the room, at the opposite side and be gradually drawn back to the outlet, where, having gained the impurities of dust and respiration, and parted with much of its heat, it will be safely carried from the room out-of-doors. By this means, the air in the room becomes more thoroughly changed and more uniformly heated than if the warm air is brought in near the floor at one side, and the cold air taken out at the other; at least this is the theory, and practice seems to confirm it. In addition to this "indirect" warming of the air in the room, there should be in the vestibule two large floor-registers at which the children who come with cold, wet feet, can warm and dry them before coming into the schoolroom. These registers should never be used for any other purpose, and at all other times should be kept closed.

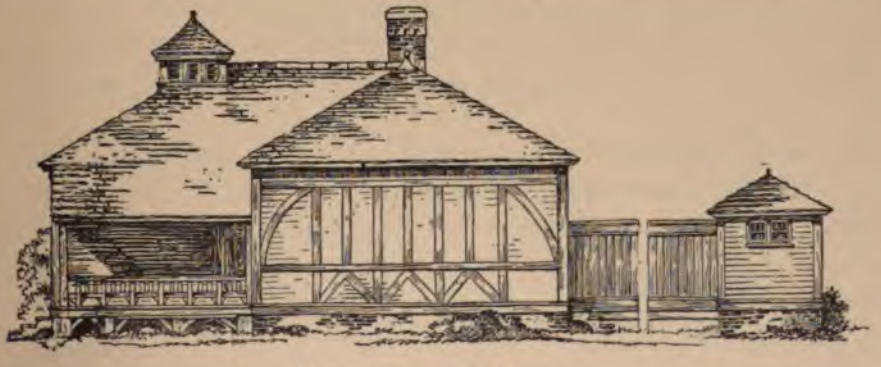


Floor Plan of Three-room School-house. Design H.

In none of these plans is there any attempt at architectural display on the exterior. The form and composition conforms strictly to the exact requirements of use. There is no added height given to the walls, no peculiar form given to the roof in an endeavor to produce an "interesting" or "picturesque" effect. The details of the cornice, of the external finish generally, of the porches and of the

Front Elevation. Design H.

ventilating turrets, are as plain as it is possible to make them. The flat casings, applied to the ends of the building which has no windows, being almost the only deviation from absolute barrenness of detail. Yet it may be observed that, although the requirements of these buildings are so exceedingly similar,—and it would appear at the first thought that all the school-houses of a given size, if strictly utilitarian in construction, would necessarily be identical in external appearance,—it will still happen that the slight variations arising from almost imperceptible changes in dimensions and proportions, differences of location and surroundings, and an endless variety of colors, will give to each of these buildings an outward appearance and expression peculiar to

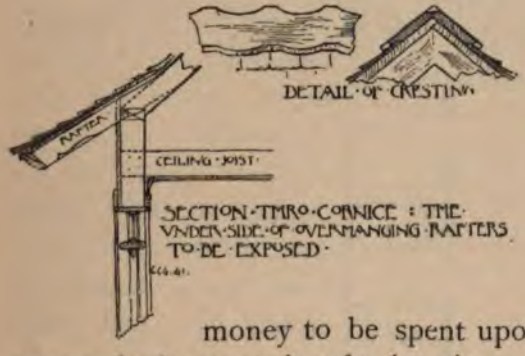


Side Elevation. Design H.

itself. This will be true even of those that are built to answer in the most simple and direct fashion precisely similar requirements. A few inches more added to the projection of the eaves; a slight increase or diminution of the width of the casings at the corners and elsewhere; a little more breadth to the windows, or a little less height, but not enough to affect their utility or to modify the cost of the work; a steeper or flatter pitch to the roof; variations in the quality and style of the outer boarding;—all these things and others may be indefinitely changed without departing from the general principle of keeping closely to the practical requirements of actual use.

CHAPTER IX.

A HIGHER PLATFORM.

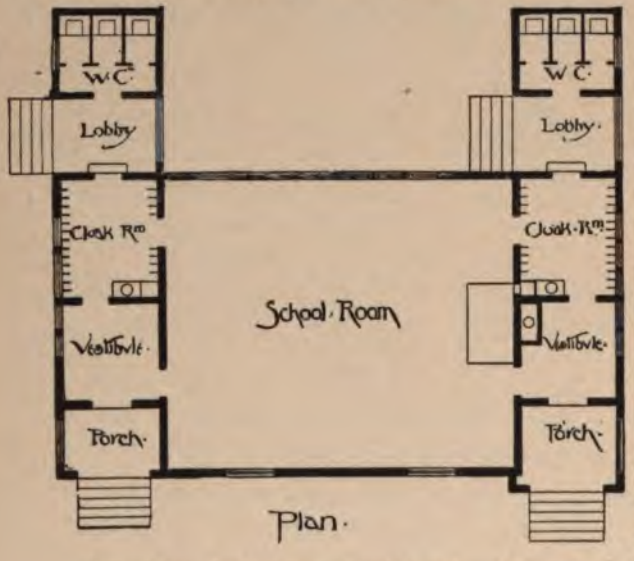


ONCE again the single cell, but developed under more favorable circumstances. Parents have a more profound respect for their children, and a more earnest desire for their well-being. There is also a little more money to be spent upon the building, not alone for its external adorment, but for interior comforts and conveniences; those amenities which, although by no means indispensable to a well-ordered and profitable school, do still add to its efficiency, and tend to elevate the pleasure and increase the profit of its members. It has separate porches and entrances for the boys and girls; their cloak and toilet-rooms are quite distinct, and more complete than in the preceding plans.

It may be true that in the ideal school—"the school of the future"—all the boys will be young gentlemen in the best sense of the word, and all the girls young ladies, and that it will be as well for them to share their front porch and hall together as it is for the well-trained children of one family to share in each other's society the family sitting-room and play-ground; but in the ordinary country or village school, to say nothing of those in or near large cities, it is undoubtedly

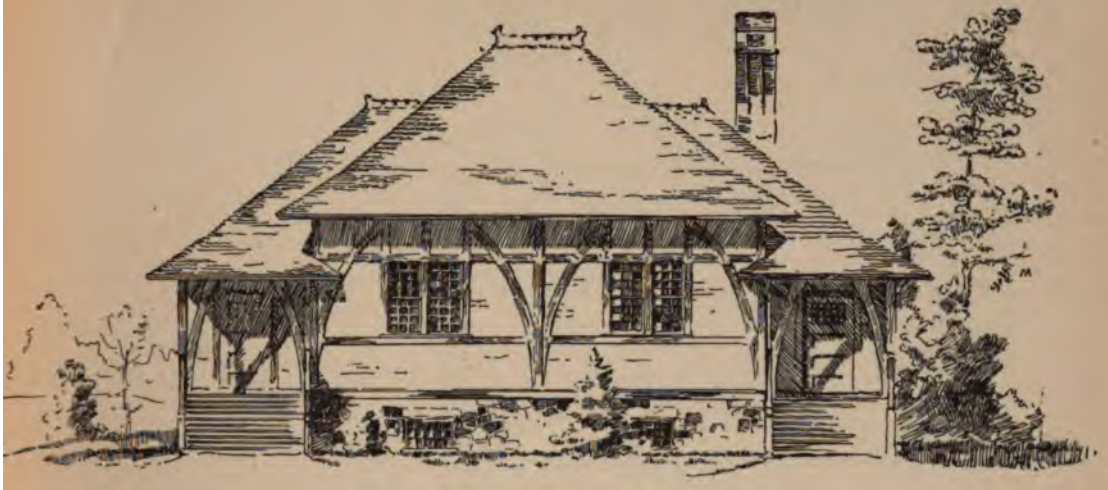
better if there is money enough and room enough, to provide separate lobbies and cloak-rooms, and, in a general way, keep the play-grounds separate.

This building is upon a somewhat higher plane than its predecessors in regard to these accommodations, as well as in its more thorough construction and elaborate finish. The wood frame-work of the ceiling, that is, what would be the second floor if there were another story, instead of being composed of joists of uniform size, the under side covered with a plane surface of laths and plastering, or perhaps of simple matched sheathing, consists of large beams reaching from wall to wall, the shortest way across the room; on these, which are placed not more than six or eight feet apart, are laid light joists, to which, between the beams, is applied the wood panelling that takes the place of the ordinary finish.



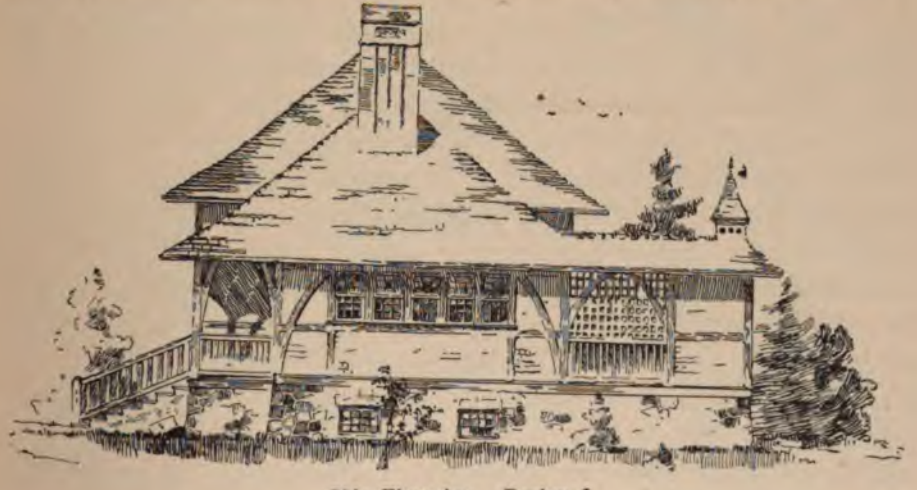
Floor Plan Single-room School-house. Design J.

A rough boarding is first nailed to the joists, this is covered with building paper for the sake of saving the heat that would otherwise escape through the cracks, sure to be caused by the shrinking of the boards; and to prevent the entrance of dust that accumulates everywhere in this world of dust and ashes. Underneath the paper, the finished panelling is applied. The beams themselves, which support the joists, and which show in the room after it is all finished, will be of seasoned timber, planed and chamfered or rounded as to their corners; where such timber cannot be obtained



Front Elevation. Design J.

they will be cased. The plastering on the walls, between the wood cornice around the top of the room and the top of the high wainscot, will be painted and made as smooth and dust proof as possible.

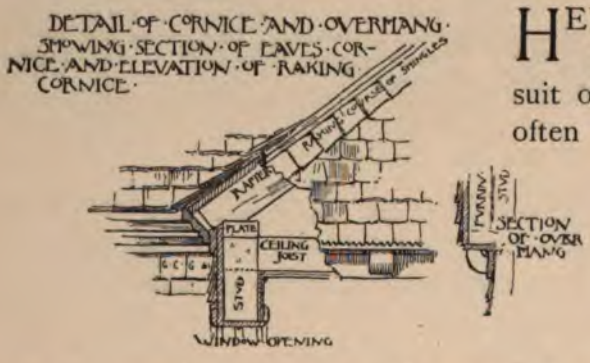


Side Elevation. Design J.

There is a basement under the entire building, but it is only used for the furnace and the fuel, and the entrance is from the outside.

CHAPTER X.

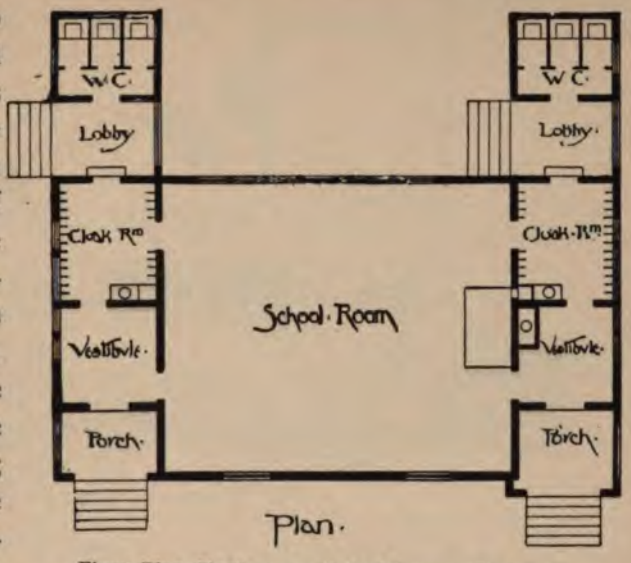
A DISTINCTION WITH LITTLE DIFFERENCE.



HERE again is the same floor-plan, treated to a different suit of clothes; and it is not often that a man seems to be more completely changed, as to his external appearance, by the clothes he wears, than is this building by the different material and cut of its overcoat. In design J, the roof is broad and low, coming far out over the walls, almost like a piazza. In this, it barely covers them. On strictly utilitarian grounds, perhaps the best thing would be the happy medium; that is, a sufficient projection to protect the upper part of the walls and the tops of the window-frames from the falling rains, but not enough to darken the windows or to add materially to the weight of the roof. On æsthetic grounds, and particularly as a matter of picturesque effect, probably either of these is better than the middle course; but either of these extremes would be thought to have more "character," more "expression."

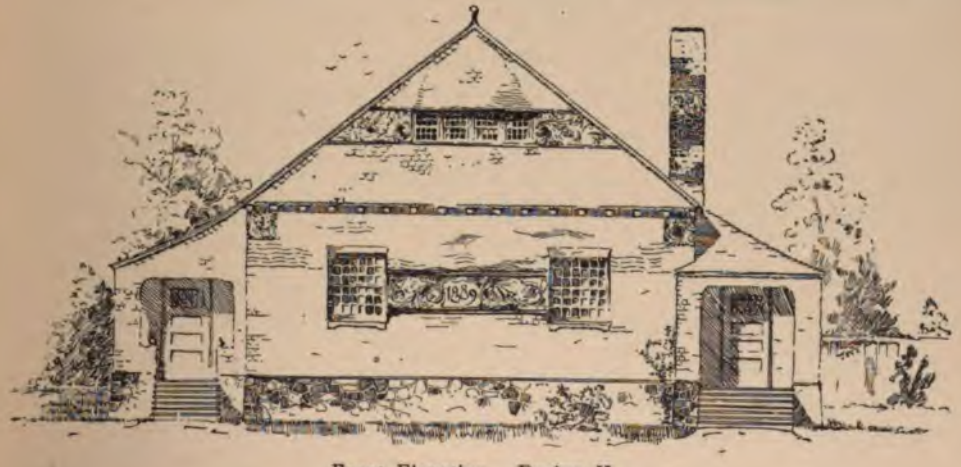
At first sight, this design would appear to represent a cheaper building than the other, on account of its severe simplicity of detail. In fact, if properly carried out, there would be but little difference of cost between the two. Unless the details of this design are thoughtfully studied, and the work faithfully executed, the whole

effect would be cheap and poor. The carved panels, the curving lines of the shingles on the upper part of the main walls, the notching of these that mark the overhanging of the gables and other breaks in the vertical walls, the terra-cotta in the chimney, and the rubble of the underpinning; all these things must be carefully treated, because there is nothing to draw attention from the minutest details of the work, as there is in the more complex and showy design.

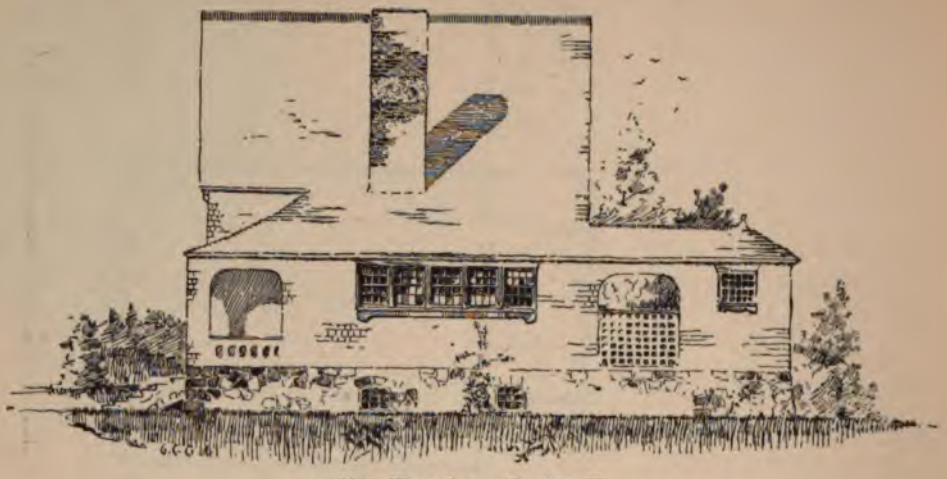


Floor Plan Single-room School-house. Design K.

This building is shown with the outer walls shingled quite to the



Front Elevation. Design K.



Side Elevation. Design K.

base; but the base is three or four feet from the ground, and, as I have said, this school is supposed to be in a community where the children of all ages have been taught to take an honest pride in their public institutions, and would as soon think of scratching their own faces as of wilfully injuring the school-house. I am aware that this is not a universal condition in this happy land of freedom and common schools, but I am also aware that it ought to be.

CHAPTER XI.

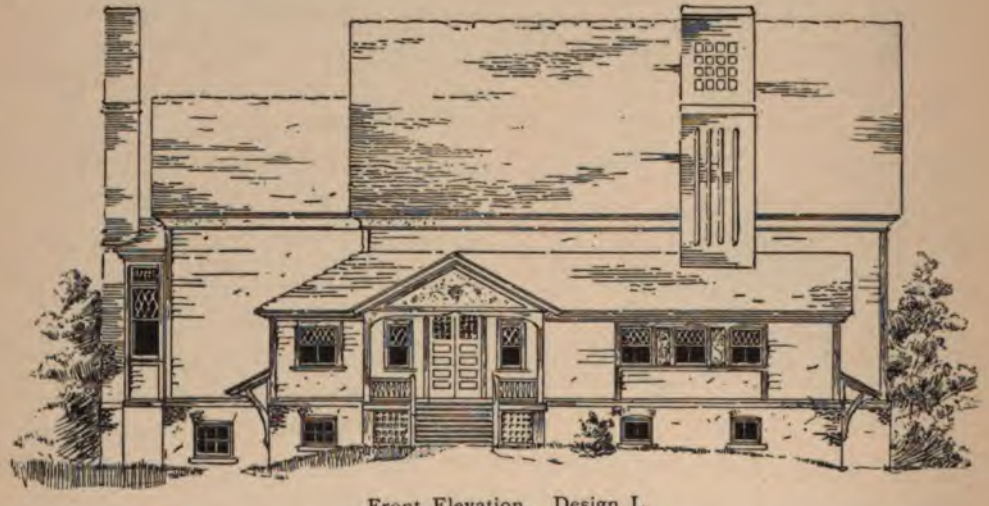
FOR THE BEST FAMILIES.

IT may be that the time is rapidly approaching when there will be no "country;" when all the people will have gathered into cities and large villages, where their children can be taught by the hundred; where the rooms provided for educational purposes, the number of teachers required to instruct them, and the labor of each one of these teachers will all be reduced to the lowest terms, in the same general way that manufacturing is every year carried on with less and less of individual skill, and more and more of automatic machine work. Let us hope not. Let us hope that the quiet old towns that do not expect or desire either to go to the cities or to have the cities come to them, will maintain their dignity and best characteristics for many generations.

It is in such country towns and villages that a school-house, like number eleven, would be at home. The children all belong to the "best" families; which, by the way, are the best in the world. There are no difficult social problems to be encountered, because "aristocracy" of the genuine kind is the normal condition of them all. If there is an occasional scapegrace among the boys, his character and

antecedents are so well known, and he is in such an insignificant minority, that he has little influence, except as a useful example of what is to be avoided. In such a community, the school-house stands next to the church in the popular regard. It appeals to high moral sentiments, and its neglect would be esteemed a disgrace only second to the neglect of the religious sanctuary.

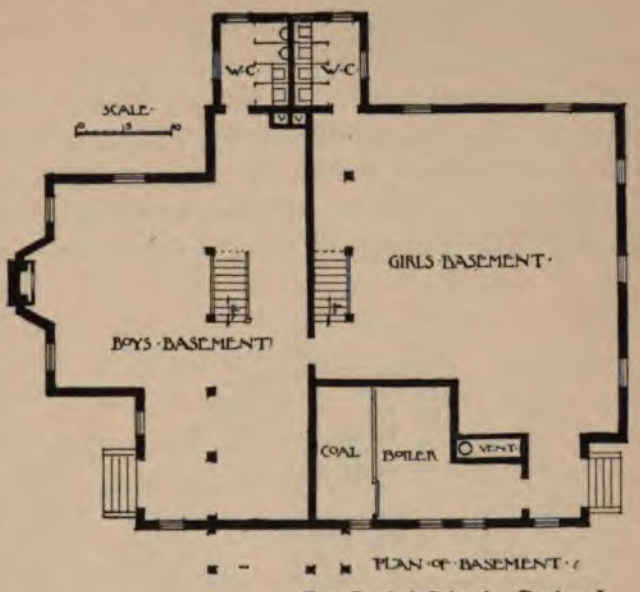
It is decidedly a school-house of the country, where manual labor of some sort is a thing, of course, for young and old; there may be in the summer term hardly a score of children, and in the winter three



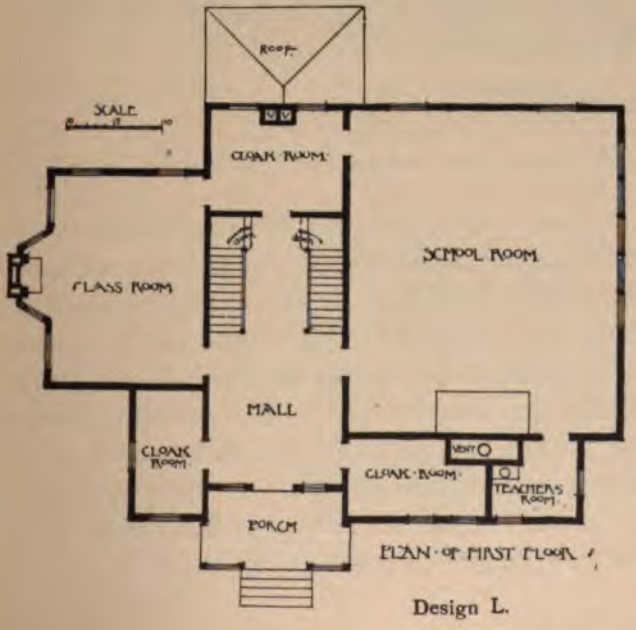
Front Elevation. Design L.

or four times as many. The high basement, built of native rubble stones that doubtless grow on the premises, contains not only the steam-boiler and fuel-room, but two large, light apartments, in which the boys and girls may respectively gather before the opening of the school-room, and which will serve for play-rooms in stormy weather Lockers are arranged as in a well-planned gymnasium, where heavy wraps, overshoes, and rubber-boots may be left in safety and good order. On the main floor, there are more private dressing-rooms, one for the boys, one for the girls, and one for the teacher. There is a

small room for the school-library, and a larger one for a recitation-room. When all the school-children in the district between the ages of four and twenty-one are in attendance, there may be three teachers, and the library would also be needed as a recitation-room for the higher classes In the busier time of year, when only



For Graded School. Design L.

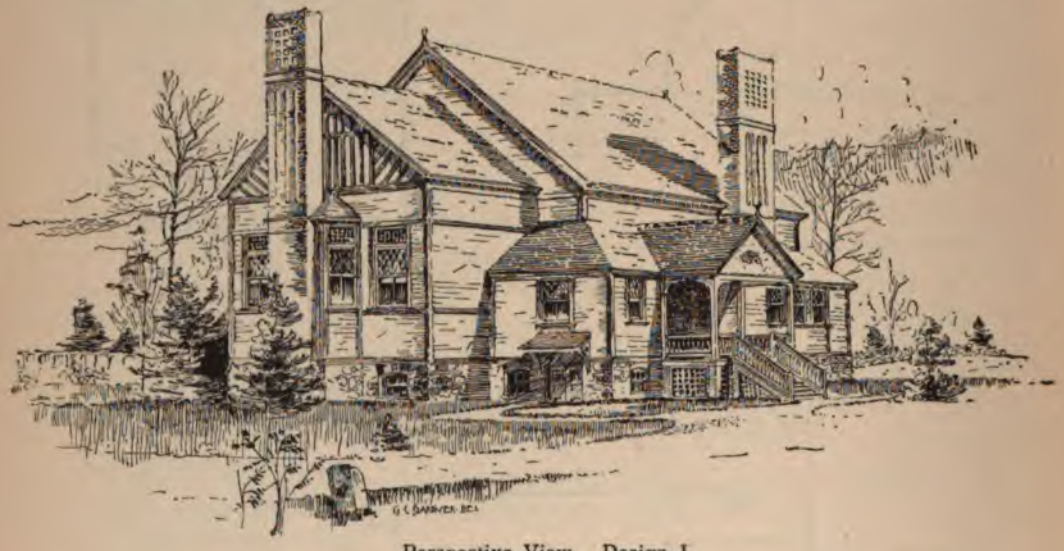


Design L.

the youngest can be spared from field and farm, the recitation-room alone would easily hold the entire school. As the building is warmed by steam, the fireplace in this room would only be used for purposes of good cheer, or on chilly mornings, when it is only necessary to "take off the chill" at the beginning of the day. A pleasant

arrangement of this room would be to place the teacher's desk in the corner of the room at the left of the fireplace, and set the recitation-seats diagonally across the room in front of the teacher. The pupils would then face the fire, the teacher, and the blackboards on the wall at the teacher's right.

The windows at the side of the main school-room opposite to the teacher's platform, would have inside shutters which would usually be



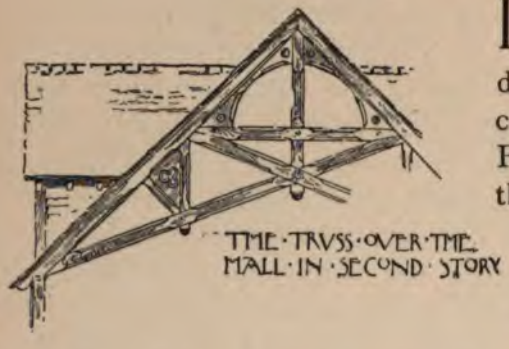
Perspective View. Design L.

closed; but as I have said, it is well to have the windows there, even if their light is never neeeded, that they may be opened for ventilation. The only serious objection to them is that careless teachers are liable to leave the blinds open, when they ought to be closed; but that is not a real argument against the windows. It may be possible to ventilate a school-room so thoroughly, that there will be no perceptible difference between the atmosphere within the building and that out of doors; but I doubt if that perfection of ventilation has ever been reached in practice. As a matter of fact, the air in the occupied rooms grows steadily worse and worse the longer they are occupied, in spite of all

attempts to the contrary, at least up to a certain degree of impurity; and the surest mode of changing it, is to open all the windows to their fullest extent and call in outside assistance. I am not sure but it would be wise to proclaim it as an infallible rule that all the windows of every school-room must be thrown wide open as often as every half hour while the school is in session, making no exception, unless there is a driving storm of rain or snow, when the windows on the exposed side might be kept closed. In extremely cold and windy weather it would take but a fraction of a minute to change all the air in the room. Artificial ventilation, however scientifically contrived, is imperfect and unreliable at the best, largely at the mercy of outside atmospheric conditions, the direction of the wind, the temperature, moisture, and other ever-varying and always uncontrollable causes. Add to these the thoughtlessness, and too often the ignorance of teachers and others on whom this care depends, and it remains a stubborn fact in many cases, that our children are compelled to take with the education which the State furnishes, bodily disease and life-long infirmity. All experience proves that an out-door life is the most favorable, if not the essential, condition of health for children; it surely follows, that the more nearly the atmosphere within our buildings can be made to resemble that outside their walls, the better. With this result, no considerations of financial economy, or supposed advantages in the way of systematic routine, should be allowed to interfere.

CHAPTER XII.

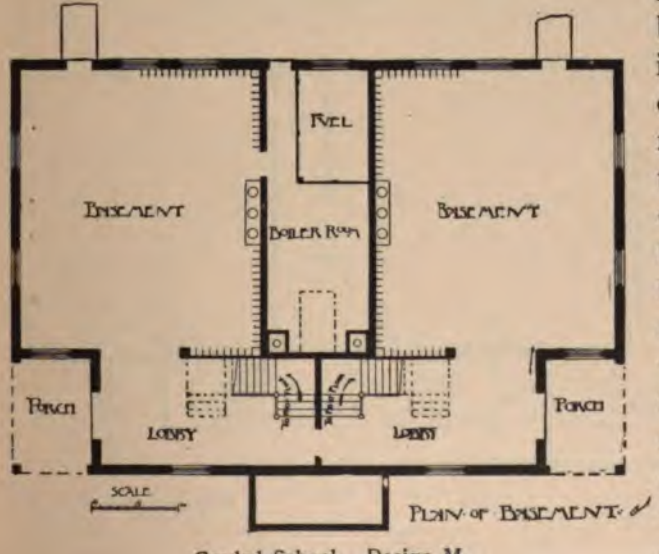
RELATIVE DIMENSIONS.



IN the building of school houses, as in all other mundane affairs, a certain amount of compromise seems inevitable. For many reasons it is desirable that all our work should be thorough and enduring, especially that which is done for permanent public institutions. But we have learned by experience, that no sooner are our most carefully considered undertakings completed, than the conditions change under which they were begun; and if they were to be repeated, we should alter them in many respects. Hence, the common saying that every man ought to build two houses for himself; one as an experiment, the other to correct the mistakes of the first. But though building a house often seems equivalent to a "liberal education," it is doubtful whether the last will prove any more satisfactory than the first, especially if he is his own architect: the owner grows wiser, his ideas and his circumstances are constantly changing in spite of himself, and he can ensure his own satisfaction only by resolving to be content with what is the best thing at the time and under the circumstances.

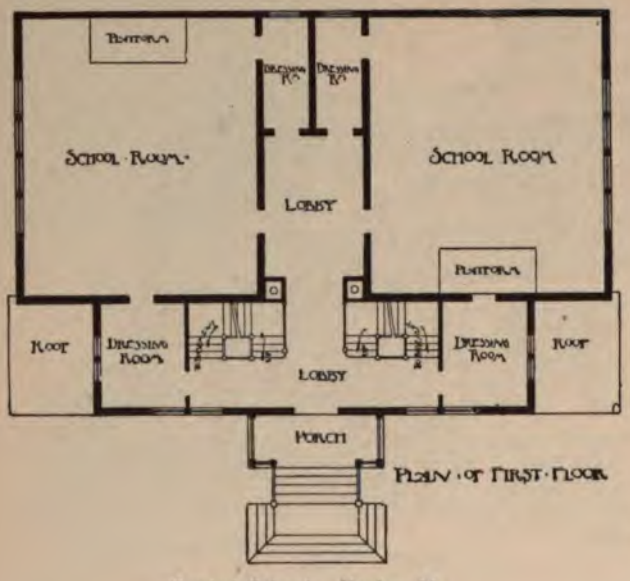
Something of the same uncertain element, but in less degree, enters into the planning and construction of school-houses. Hardly

Perspective of Design M.



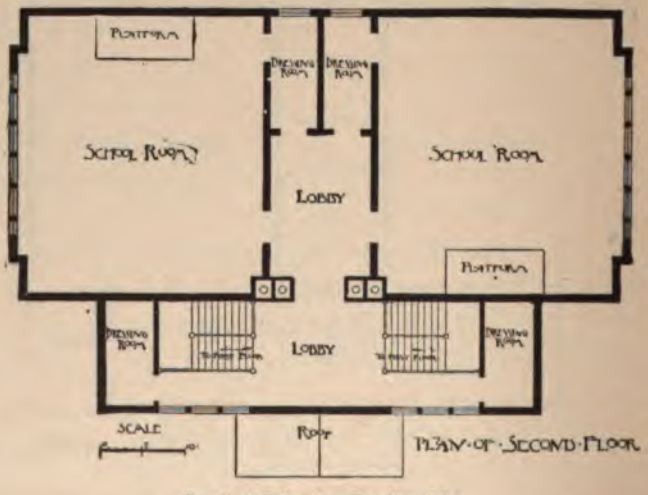
Graded School. Design M.

a generation ago, the best school-buildings in large towns and cities contained one room which held all the scholars above a certain grade, whether there were fifty or two hundred. Two or more recitations were conducted in this room at the same time, and only the younger children were separated into groups or grades in

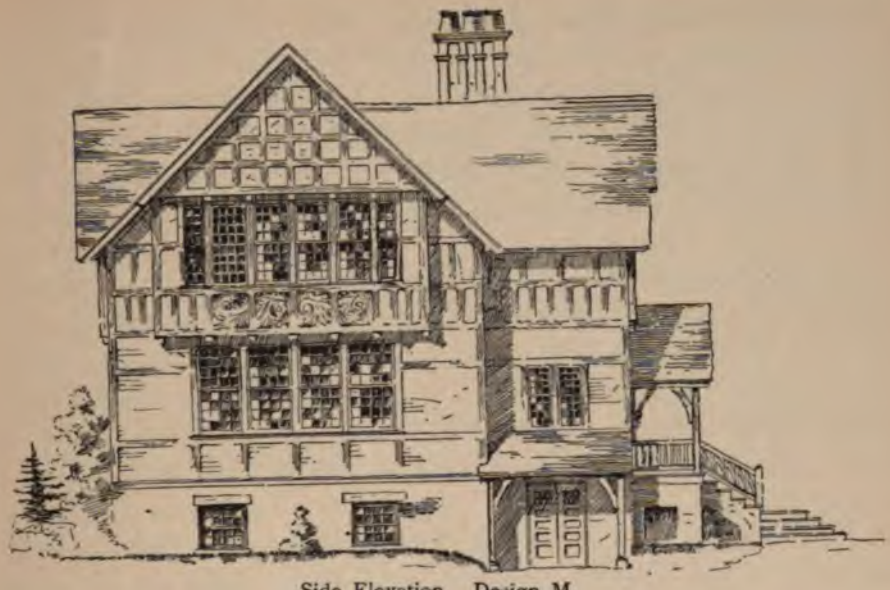


Graded School. Design M.

which a limited number were given to each teacher. Now, the large room is abolished, unless used as a hall for general exercises, the theory of public education having apparently reached this conclusion; that one average teacher can properly control and instruct during four, five, or six hours in the day, from forty to fifty children; or, at least, that this proportion of instructors to pupils is the most expedient ratio. Yet I suppose it would be difficult to explain why thirty-five is not the maximum limit, or even twenty-five; or that sixty-five or seventy may not be as advantageously taught at once, as fifty. However, we must accept the present situation and plan accordingly. In large graded schools, there is no attempt

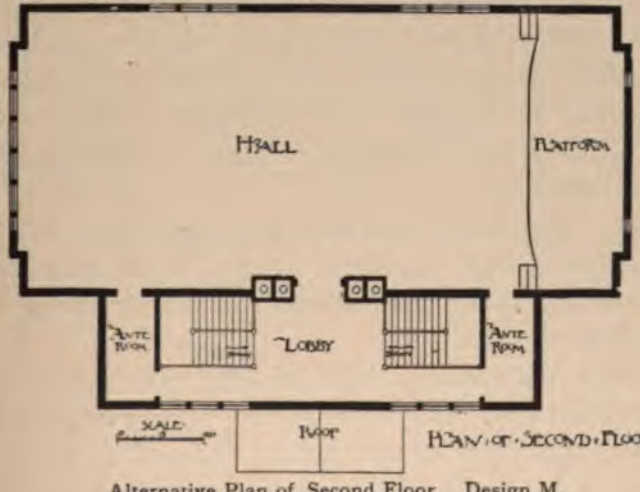


Graded School. Design M.



Side Elevation. Design M.

to adapt the size of the single rooms to the total requirements of the ward or district, but only to accommodate the several hundreds or thousands of children in the most satisfactory manner. It appears



Alternative Plan of Second Floor. Design M.

that, in such schools, the rooms must be of sufficient size to hold seven rows of seats and desks, with seven in a row, or as near to that magic number as possible. A medium-sized, well-fed teacher must be able to pass between the rows and all around them, next the walls of the room. There must be space at the rear for recitation-seats, for all recitations are conducted in the rooms where the studying is done, and space enough in front for more or less mobilization of the school. Careful measurements are made to ascertain the least possible dimensions that will admit these arrangements and exercises, and the building which will contain the largest number of children, spread out and cut up into the necessary shape to receive their public instruction, is considered the model. Its excellence consists chiefly in the fact that every extra foot added to its size adds the fraction of a mill to the taxes of the parents who have to pay for it. Twenty inches between the rows of desks is certainly better than sixteen, the limit sometimes prescribed; and a width of two feet is better than twenty inches. Against the side walls there should never be less than two and a half feet,—and one or two feet more than that will do no harm,—with proportionate space around the teacher's platform and at the back end of the room; especially should there be ample space in front of all blackboards, which will usually be on the wall at the teacher's left and opposite the broad windows. Of course, these more liberal dimensions mean a little more material for the building, a little more fuel to keep it warm, and a little more sweeping to keep it clean. But they also mean far more satisfactory results in the weightier matters of health and conduct.

If the time ever comes when men reverence their children as they ought, and educate them as they deserve to be educated, the first question concerning those things which affect their lasting welfare will not be a question of cost.

Number XII is a graded school of four divisions. The scholars all enter the basement, the boys at one door, the girls at another, and leave their hats, caps, cloaks, and overshoes in the lockers provided, one for each scholar. At the hour for opening the school, they

pass to their respective rooms above. The stairs are not more than four or four and a half feet wide; greater width is unnecessary in a small building where there is no danger of a panic, because in a well-trained school there is rarely an occasion for more than two to pass over them abreast. They are easy of ascent, the height of the steps not exceeding six inches, and their width being at least eleven and a half inches.

For the convenience of the teachers and pupils there are two ante-rooms for each school-room, communicating directly both with the room and with the lobbies. In warm weather, when the doors of the base ment are likely to be left open, and when the outer wraps of the children will occupy but little space, the use of the lockers in the basement may be discontinued, and the ante-rooms may be used as cloak-rooms.

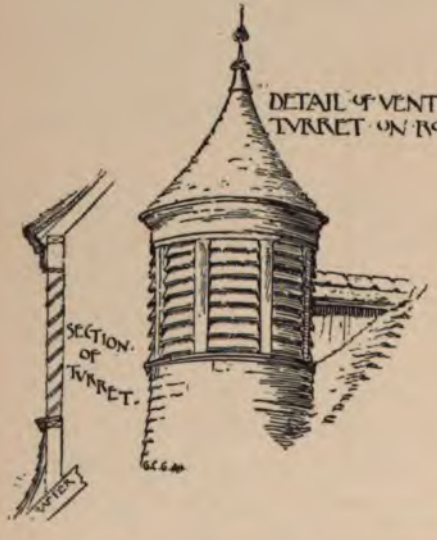
The ceilings of the rooms of the second story are not level the entire width of the building, the side walls being but nine feet high. From that point, the finish of the rooms follows the slope of the rafters for a few feet, above which it is level and of the same height as the rooms below.

An alternative plan of the second floor shows how this building may be partially adapted to the changing spirit of the age, by finishing the upper story as a hall for the use of the school on special occasions; and when an increase in the number of pupils requires four rooms instead of two, converting the hall into two school-rooms.

If this second story should be permenantly used as a hall, an open trussed roof might be constructed, giving it a much greater height in the centre.

CHAPTER XIII.

SAFETY IN WOOD.



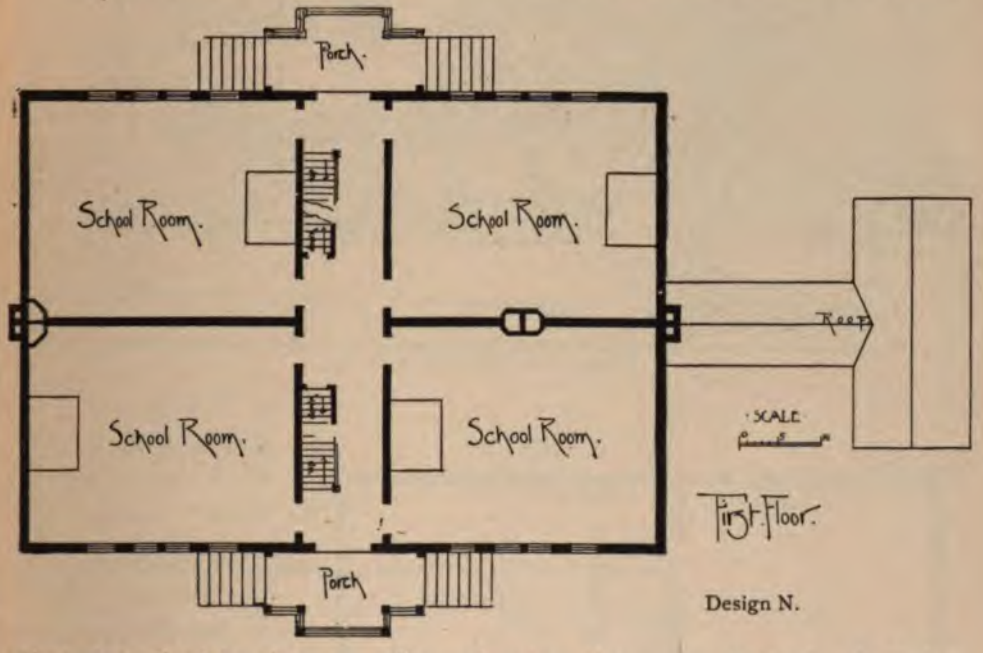
THIS building for a graded school contains six rooms of uniform size, and a hall on the second floor. Each room will accommodate forty or fifty pupils, and the hall will easily hold them all, when they are compactly seated. The pupils enter the basement, which is mainly above the level of the ground around the building, and is divided longtitudinally into two equal parts by a wall through the centre. The forward end of each part of the basement contains lockers arranged around the walls, for the outer garments, as in the preceding plans. In the rear, which is a play-room, are the wash-bowls; and at this end of the basement are the walks leading to the water-closets in the yard. The room for boiler and fuel is in the rear corner of the girls' side.

In the centre of each half are the stairs to the upper stories.

The first story contains four school-rooms, all of which receive light from the left side of the seats, and all are entered directly from the central hall, which should be twelve feet wide or more. It is always safe to say "or more," for though it would be possible to make

these halls and ante-rooms too large for comfort or convenience, it rarely happens that there is too much liberality in this direction, while the opposite fault is almost invariable. This wide hall, passing directly through the centre of the building, will add much to its comfort in warm weather, and aid in its ventilation at all times. The side porches, which also protect the basement entrances, give direct access to the first floor hall from the outside.

The warming and ventilation of these rooms is substantially like



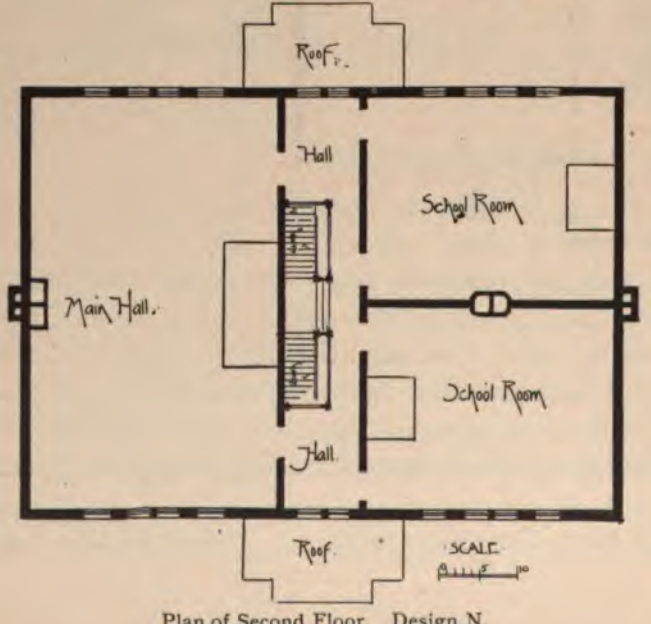
Design N.

that described in the preceding chapter, the warmed fresh air being brought into the rooms through registers within a few feet of the ceiling, and the foul air withdrawn through the floor by means of the large ventilating shafts, which are at all times warmed by steam-pipes.

The two school-rooms of the second floor are precisely like the rooms below them, the other half of this floor being occupied by the hall.

It may well be questioned whether a public edifice of this size

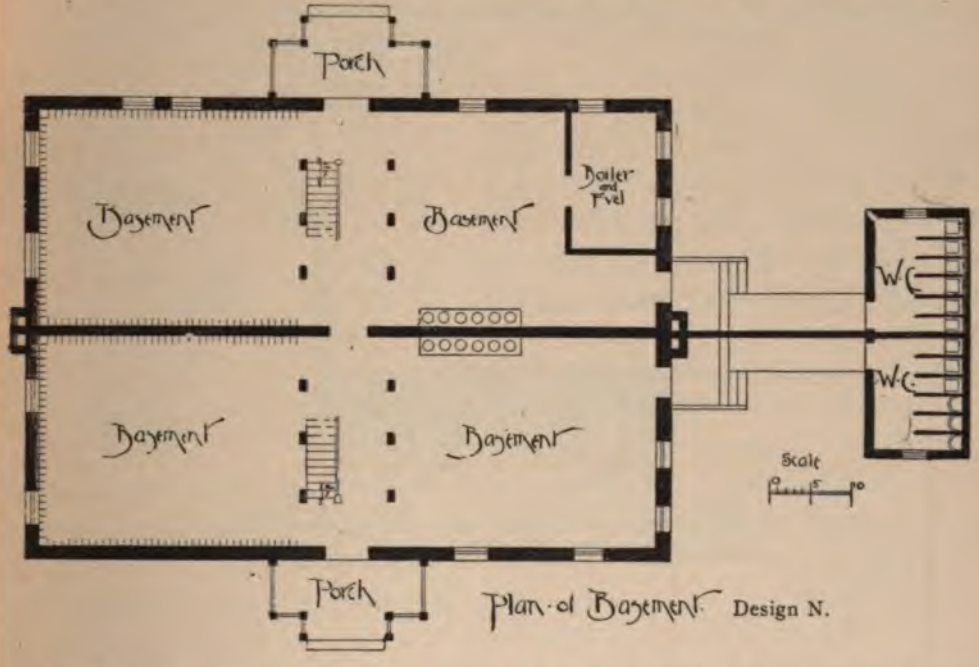
Perspective View. Design N.



Plan of Second Floor. Design N.

and for this purpose should ever be built of wood; but economical prejudices will often prevail, and it is possible to construct a building with a wooden frame, that shall be warm, dry, and at least "slow-burning." If the spaces between the studs of the outer walls and of the partitions are filled

with mineral wool, or, perhaps, for the sake of closer economy, partly with that material and partly with soft bricks; and if the floors are made in the manner of mill floors, that is, with large beams supporting planks, instead of thin joists with furrings underneath for the laths; and if, in case of two or more stories, there is an extra thickness of flooring to cover the deafening, a wooden building is comparatively safe. The slow-burning construction should extend to the roof as well as to the walls, floors, and partitions; for



Plan of Basement. Design N.

although the roof is further removed from the ordinary sources of danger, for the same reason, it is more difficult to control if a fire is once fairly started. If shingles are used, and there are many good reasons for using them on a wooden building (or on any other for that matter), the roof-boards should receive a coat of common lime mortar, half an inch thick, before the shingles are laid. If this is partially dried there will be no difficulty in laying the shingles in the usua

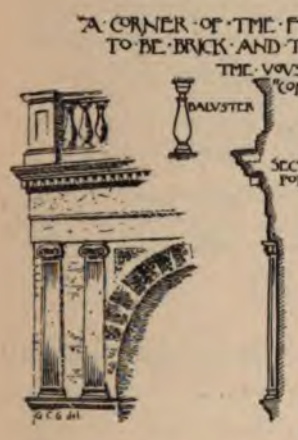
way, the nails being a trifle longer than is necessary when no mortar is used. This layer of mortar will make the roof warmer in winter, cooler in summer, will preserve the shingles from decay, and very much retard the spread of fire, if the roof should be ignited from the outside. Fortified in this way a wooden building would doubtless be safer as regards fire, than a building having brick walls with wooden furrings, partitions, floors, and roofs, all put together in the usual manner.

This design shows a frame building, the outer walls of the first story covered, with clapboards, those of the second with shingles.

DETAIL OF SLOW BURNING FLOOR: THE LARGE BEAMS 6'0" ON CENTERS; 2" PLANK LAID ON BEAMS; UPPER FLOOR, ⅞ SEPARATED FROM PLANKS BY DEAFENING; ½ SHEATHING UNDER PLANK FOR FINISHING OF CEILING BELOW

CHAPTER XIV.

NOTHING TO GROW OLD.

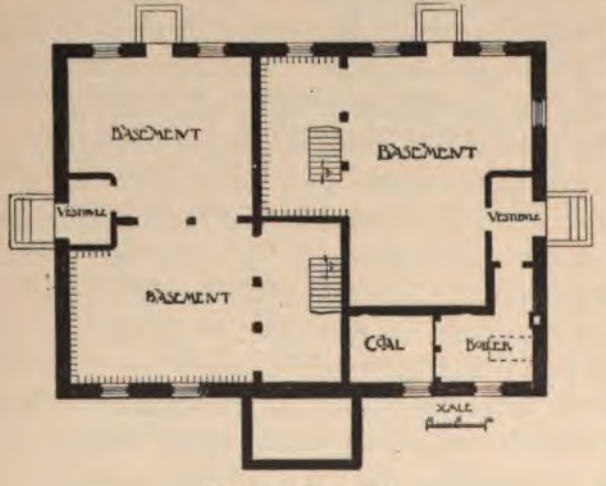


THIS building is for a school having one higher grade, and four of nearly uniform rank and size. It would be suitable for a high school in a village or small city, the large room being for the use of the principal, and the four smaller rooms for the assistant teachers and their classes.

The plan is exceedingly simple and well adapted to a mode of construction that would be practically fire-proof. The outer walls of the basement are of stone ashlar ; all the other walls and partitions are of brick and terra-cotta. The floors are of two and a half inch planks resting on large beams which are finished and exposed, the underside of the planks between the beams being covered with thin wood sheathing lined with asbestos paper, or with corrugated iron. Between the upper or finished floors and the rough plank is a layer of mineral wool or concrete, for purposes of deafening, and to render the floors more nearly fire-proof. The side walls are finished with Portland cement instead of the usual lime mortar, to the height of four feet and six inches, except under the blackboards, where it is but two feet high. This cement takes the place of the ordinary wood wainscoting, being more durable and, after painting, more easily kept clean. There are no casings around the windows ; the corners of the jambs—the "arrises"—are rounded, and the plastering on the walls

Front Elevation of Graded School. Design O.

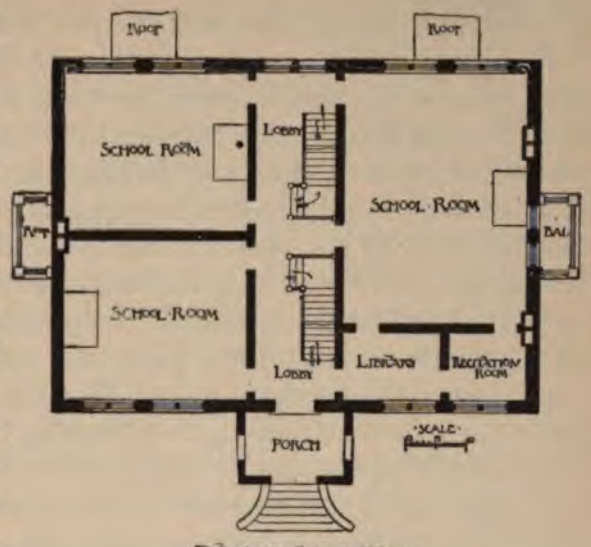
is carried around to the window-frames.



PLAN OF BASEMENT
Design O.

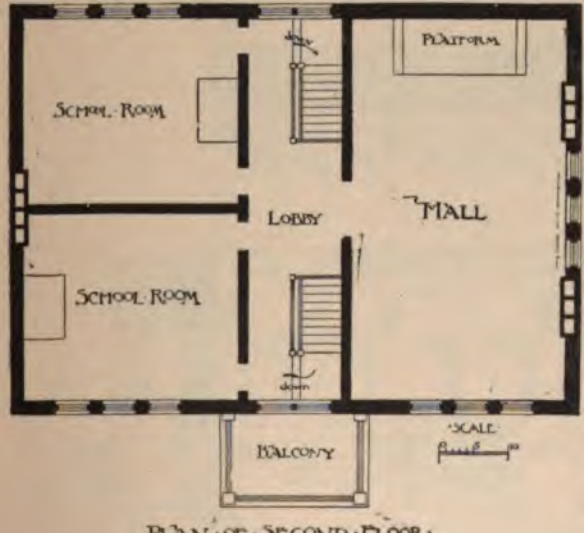
There can be no doubt that the interior finish of all school-rooms ought to be as simple as possible, both as regards quality and quantity. There are the same reasons for preserving the utmost cleanliness, and freedom from all forms of details in the finishing and furnishing that will produce or harbor dust and dirt, that exist in hospitals for the sick. In some respects this is

more readily accomplished in a building whose walls are of bricks and terra-cotta, to which lime mortar, cement, or tiles can be directly applied, than in a wooden building, the interior walls of which can be most conveniently and economically finished with lath and plaster, or with wood sheathing. The former is easily broken, besides being absorbent of dampness and moist exhalations, unless thoroughly painted, and the latter objectionable, on account of the cracks which are sure to appear after the wood has become perfectly seasoned. Wood is also absorbent, and unless very carefully protected by paint or varnish becomes musty with age. For this reason, plastered walls are preferable to common plastering, except where they are exposed to rough usage. Still, it is a mistake to lath and plaster the ceilings of any room, if it can be avoided. Even the strongest mortar, applied



PLAN OF FIRST FLOOR

Design O.

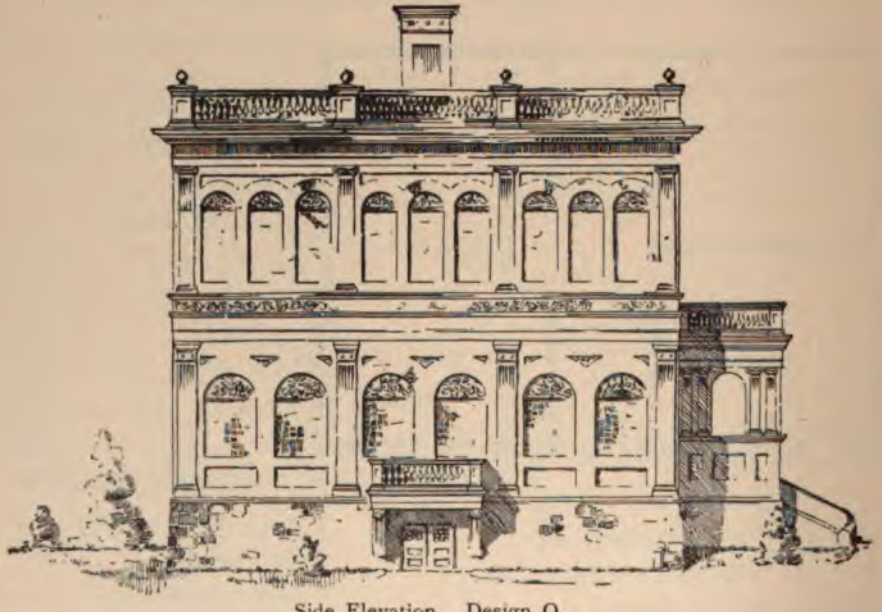


PLAN OF SECOND FLOOR

Design O.

in what is considered the best manner, has no reliable strength of its own. It is too thin and too brittle to sustain a large surface of its own weight; the shrinkage of the wooden laths, the bending of the floor timbers above, the warping of the furrings, the slight shaking of the whole building in high winds; any and all these causes are liable to crack the apparently unbroken sheet that clings to the under side of the ceilings. When once cracked, its road to ruin is steady and uninterrupted. It never improves, but grows steadily worse. It is by no means unusual for the ceilings of a "first-class" house to require re-plastering before they are forty years old, and exceedingly common to find them badly cracked before they have attained half that age. Moreover, if a sound ceiling of plastering is injured by an accident, it is well-nigh impossible to repair it without leaving an ugly scar.

It can hardly be necessary to say that the outer walls of buildings that are to be finished by plastering applied directly to the inner surface,—that is, without furring and laths,—should be hollow, in order to



Side Elevation. Design O.

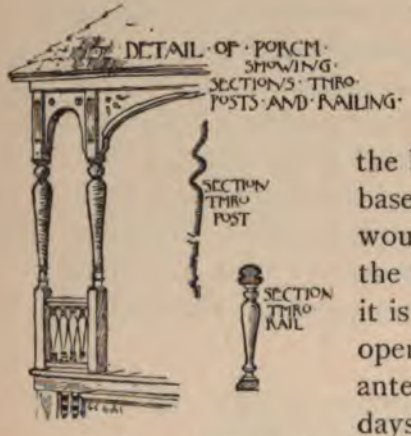
prevent the rapid conduction of heat and the consequent condensation of moisture on their inner surfaces.

The stairs in this building consist simply of the treads and risers and the "carriages" that actually support them. There is no back panelling, or under-finishing of any sort. Expense aside, it would be better to make them wholly of iron, with wood or rubber coverings for the treads. Indeed, it would be desirable to dispense with the wooden beams in the floors and ceilings, substituting iron girders and brick arches; but economical prejudices, or, rather, the absence of truly economical principles, renders the adoption of thorough, permanent, fire-proof modes of building exceedingly slow.

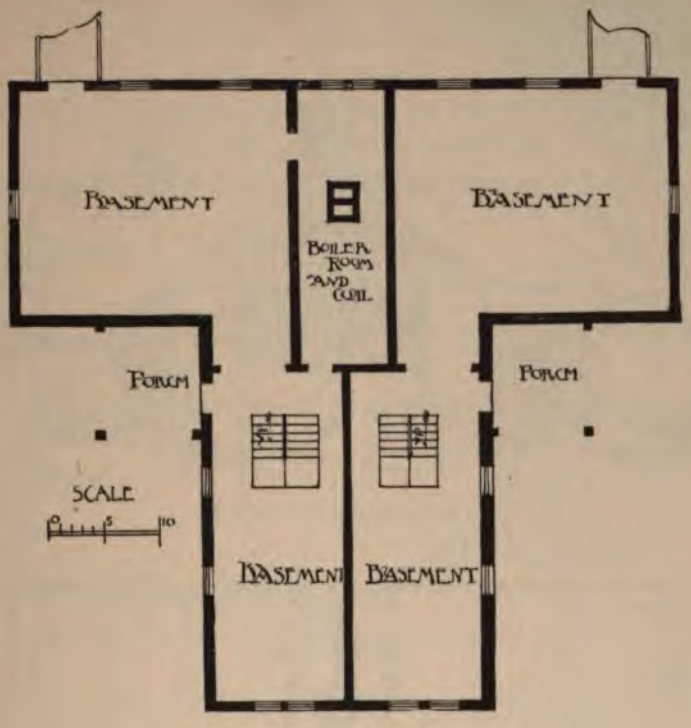
The exterior design is intended to illustrate one of the many simple effects to be produced by the use of common bricks and terra-cotta. The style is Italian renaissance, which adapts itself perfectly to the practical requirements of the school as regards lighting, heating, entrances, and exits, and the ordinary needs of a school. There is nothing about it to crumble or fall away; nothing to go out of fashion or to require the outlay of a single dollar for repairs in a hundred years.

CHAPTER XV.

THE VALUE OF THE BASEMENT.



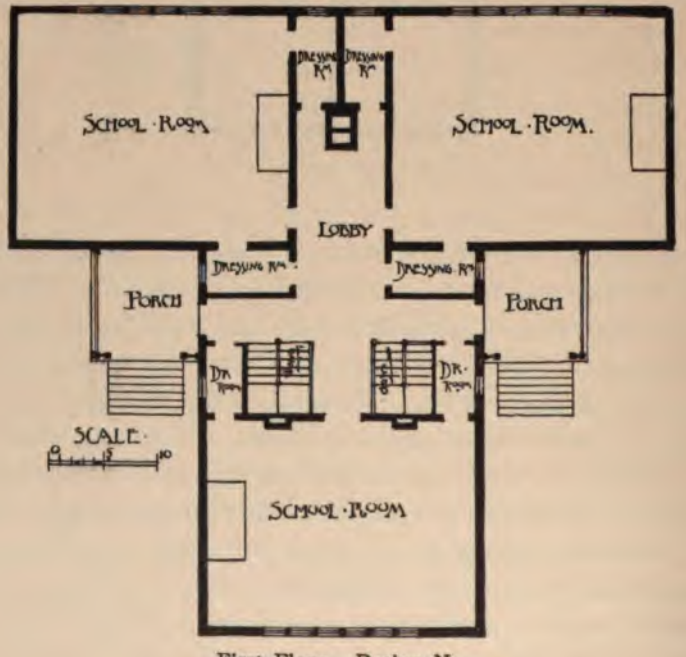
THIS is a plan for a three-roomed building, of one story above the basement. Without any change in the arrangement of the rooms, the basement as such,—that is, for use as a basement,—may be omitted; but this would be unwise. Generally speaking, the lowest floor of a school-house, even if it is partly under ground, should be light, open, and well ventilated: a sort of large ante-room, a place for exercise on stormy days, and for the assembling of the scholars at all times before the opening of the school-rooms. It may also contain the hat and cloak rooms where the size and organization of the school is such as to make this expedient. On a suitable building site, whether the surface is level or inclined to the front or rear, the cost of a basement high enough to serve these purposes will be but little more than the cost of a substantial foundation. The walls should always be of sufficient depth to extend below the action of frost, which, in the Northern States, not infrequently penetrates four or five feet below the surface. Accordingly, if the first floor is placed as far above the surrounding grade as it should be to secure thorough ventilation, dryness, and good drainage,—which will rarely be less than four feet,—it is evident that the walls will be of the same height, or about the same, whether the space under the building is made available for common



Basement. Design P.

use, or is left as a rough excavation. The walls and ceilings of the basement should be finished in the simplest manner. If the walls are of bricks they should be smoothly laid, and if of stone, the inner surface should be pointed. In either case, the inner surface should be painted a light buff or gray. Washes made of lime are too easily transferred to the clothing of the scholars. If the floors of the rooms above are made of large beams overlaid with planks, the beams may be planed, and the under side of the planks between them finished with common matched sheathing. If joists are used, the sheathing would be applied to the under side of the joists. These ceilings, as well as the walls, should be painted light colors, because the basement is liable to be imperfectly lighted, and because light-colored walls are more

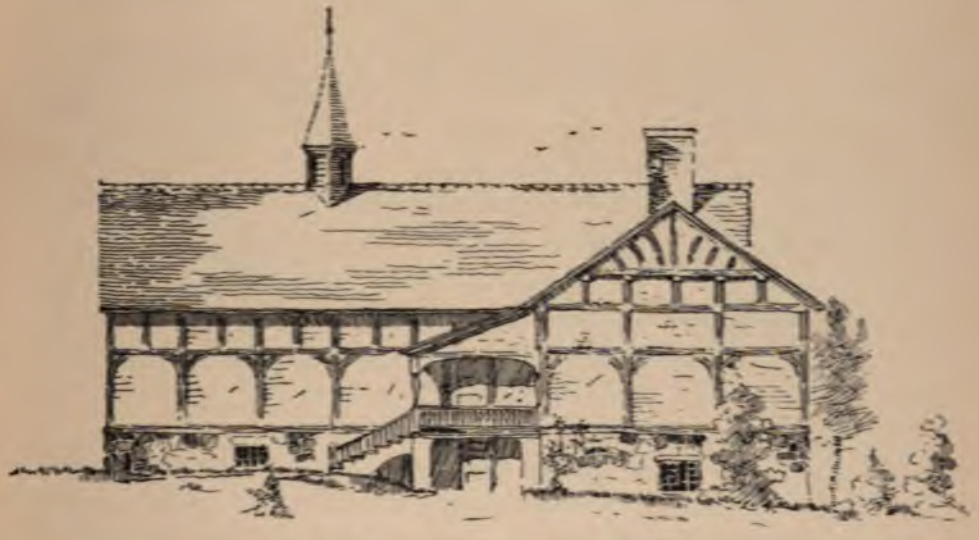
Front Elevation. Design P.



First Floor. Design N.

likely to be kept clean. The basement should not be less than eight feet high, nor more than nine. Greater height makes a longer flight of stairs to climb, and has no compensating advantages.

In this plan, the dressing-rooms, of which there are two for each school-room, are in such relation to the halls that the pupils can pass through them in entering the school-room, or not, as may be preferred.



Side Elevation. Design P.

Externally, this building, both in form and detail, is exceedingly simple. A perfectly plain gabled roof over the main building is intersected by roofs of the same style, that cover the two equal wings, and the front part of these roofs is brought down over the porches. The outside walls are relieved from absolute plainness by the flat panelling, which is formed by plain casings laid on in somewhat irregular manner. The larger spaces of the first story are filled with common siding or clapboards; the smaller ones of the upper part are shingled. The foundation wall above the ground is shown in the illustration as of

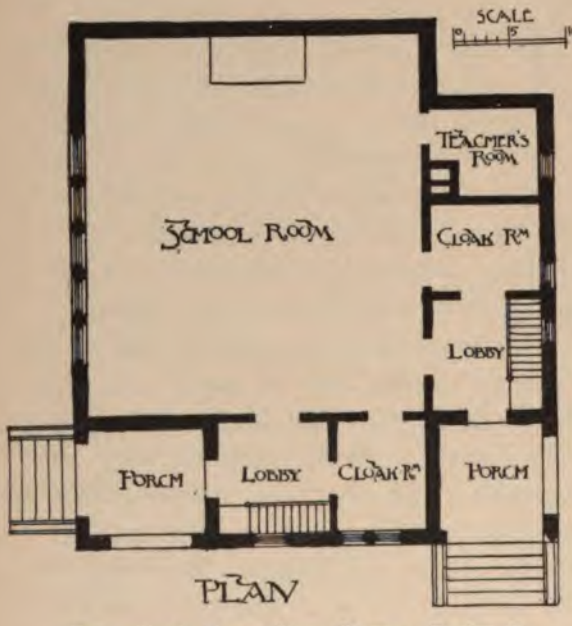
stone; but whether of bricks or of stone, the building will appear to rest more securely upon its base, if the underpinning batters on the outside. This is easily accomplished, if the wall is of stone, because it will naturally be thinnest at the top. To a less extent, and with equally good results, a brick wall may be treated in the same way.

CHAPTER XVI.

AN HONORABLE COMPETITION.

IF the present interest in industrial education ever bears fruit in tangible shape, one of the most conspicuous results will be the improvement of the visible structure and ornamentation of public school buildings. The strong reasons for exceeding simplicity in the interior finish do not apply to the external structure, though simplicity is by no means inconsistent with a high degree of refinement and elegance of design. As regards the exterior appearance, no considerations except a most imperative economy should prevent every building of this class, no matter how small it may be or how remote from what we are accustomed to call the great centres of culture, from being, in its way, a permanent monument of artistic beauty, an illuminating guide. This may seem a trite subject, but it is one that cannot be too strongly urged. Over and over again must the truth be affirmed, that our best efforts and most generous sacrifices should be devoted to the training of children and the education of youth. Nothing is more familiar to those who watch the growth and development of mind and habits, than this; that much of the influence which directs the life and character of men and women lies in the external surroundings of childhood The unconscious assimilation of the spirit of these surroundings is an exceedingly important and thoroughly "practical" part of education. Every thoughtful person of mature

age will freely admit that the general influences of school life, the influences that were perhaps scarcely recognized, much less fully appreciated, have been far more potent in shaping the ultimate conduct of life, than the information that was obtained from the daily lessons from books. Doubtless the technical "book-learning" is indispensable; doubtless it would be impossible to sustain a worthy part without it; but in comparison with the broader and less easily formulated influence of general surroundings and conditions, the facts gleaned from text-books are merely what the tools are to the intelligent spirit and well-trained muscles that direct their use.



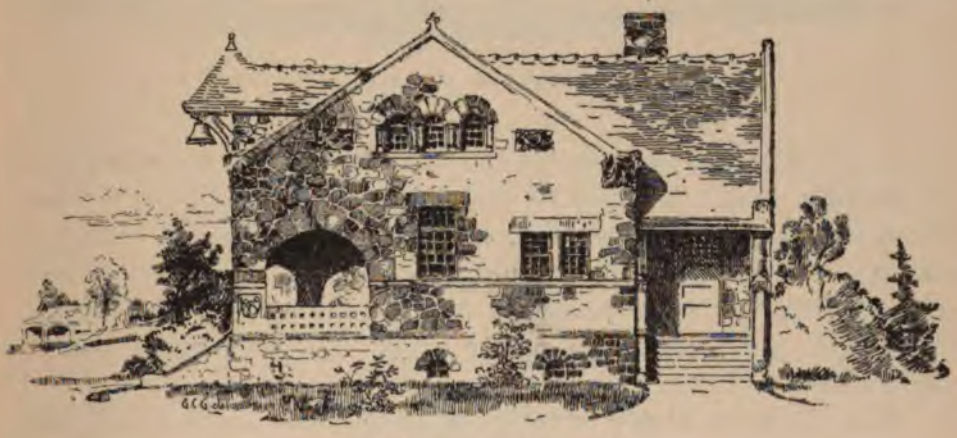
For a Single Room Stone House. Design Q.

This simple building of one room, with porches and lobbies, teacher's room and cloak rooms, whose stone walls give it an appearance not only of solidity, but of costliness and elegance, is in fact but a rough structure, of such crude materials as may be found scattered all over the ground in many parts of the country, and which the owners of the land on which they lie would be glad to deliver on the school-house lot for the sake of getting rid of them. The only addition to the cost of these walls, above such as are built around many a barn-yard, is the carving on the skewbacks, the coping stones of the gables, and about the porches.

Modelling in clay, wax, and plaster, with carving in wood and stone, would be among the essentials of a course of industrial education; and

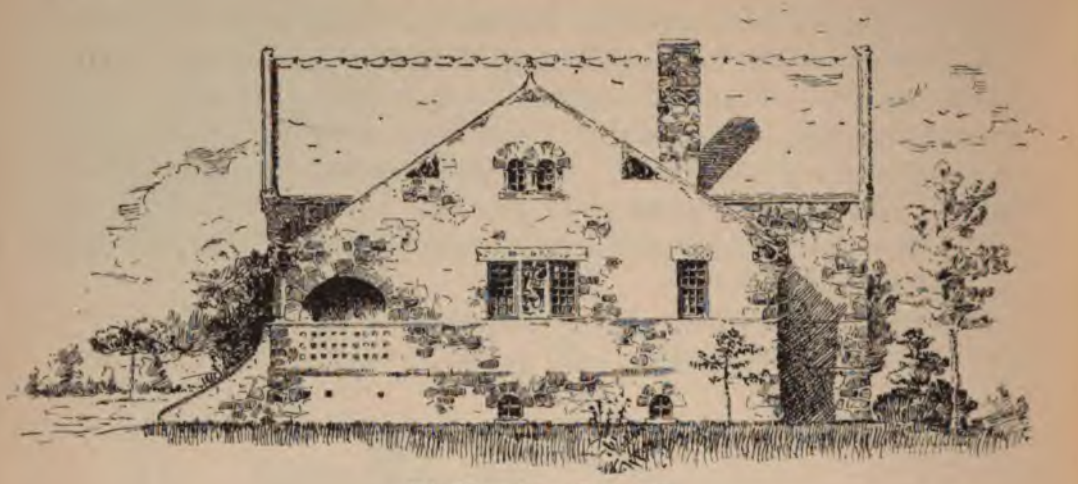
what more appropriate than that the students should exercise their skill upon the school building, as soon as they are able to work in a skilful manner. All the carving here indicated could be done better after the building is completed. Indeed, there would be no difficulty in doing it many years after. What better reward of merit could there be than the privilege of leaving in such a place an example of skill? What better incentive to worthy competition in industrial design and execution?

On a thoroughly dry piece of land, or with the drainage as described in a former chapter, walls made of these rough, undressed



Front Elevation. Design Q.

stones might be smoothly faced in the basement, and pointed or plastered on the inner surface, and they would require no other finish: but above the basement, all the outer walls of the rooms should be furred off with wood and lathed and plastered; otherwise the rooms would often be damp, owing to the condensation of the moisture within the building. It would be better still to line the interior with a thin wall of bricks, separated from the stone by an air space of one or two inches, and secured to it by iron ties; but this design is intended as a suggestion for an economical building, and the cost of the brick

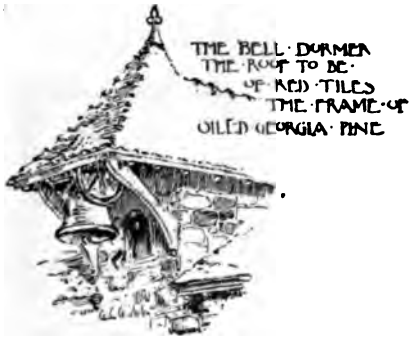


Side Elevation. Design Q.

lining would be considerably greater than that of the wood studding and lathing. As to the kind of stone that would be suitable for such a structure, it is not of the least consequence as regards looks. A variety of forms and colors would be rather an improvement than otherwise, and in a few years the entire building will take on that warm, rich gray tint, which nature so strongly recommends for all her out-of-door work.

It is, of course, highly important that the stones used in the outer walls shall be of a kind that will not disintegrate with the action of the weather; and some knowledge of practical mineralogy would be necessary on this account: for it is not always safe to trust the appearance of stones that seem to have been lying for ages in old fences, or on the surface of the ground, without suffering any injury. They may have been slowly crumbling in a way that would attract no attention where they lie, but which would be disastrous in a permanent structure. The stones that are to be carved, should be of a suitable texture for that purpose, and the lintels over the doors and windows of sufficient strength to sustain themselves and the wall above them. In a more expensive class of work, the corners of the building and the

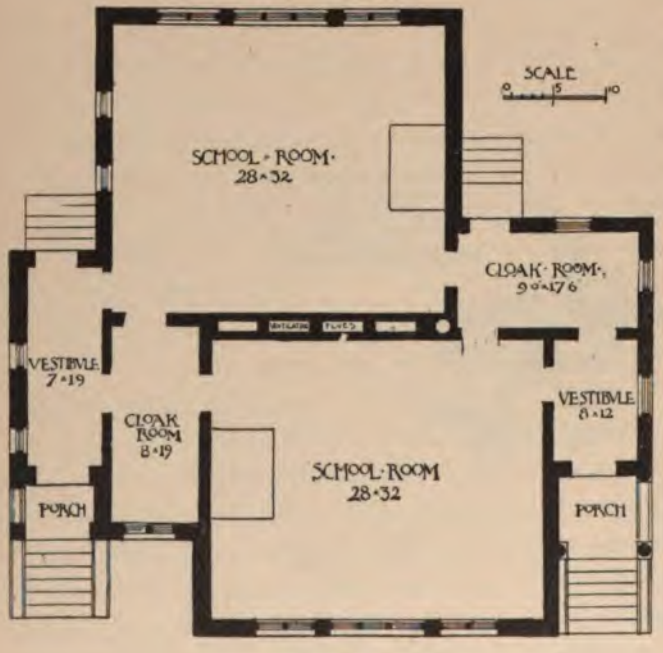
jambs of the doors and windows, as well as the caps and sills, would be of dressed stone. In work of this kind, there is no valid reason why they may not be built up of the same rough materials that are used in the body of the wall, if the separate stones are of fairly good shape and not too hard to be broken without great labor. When they are hard and rough, it would be a large economy to use hard bricks for the dressings in just sufficient quantities to overcome the irregularity of the rough material.



CHAPTER XVII.

A BODY OF STONE WITH MEMBERS OF CLAY.

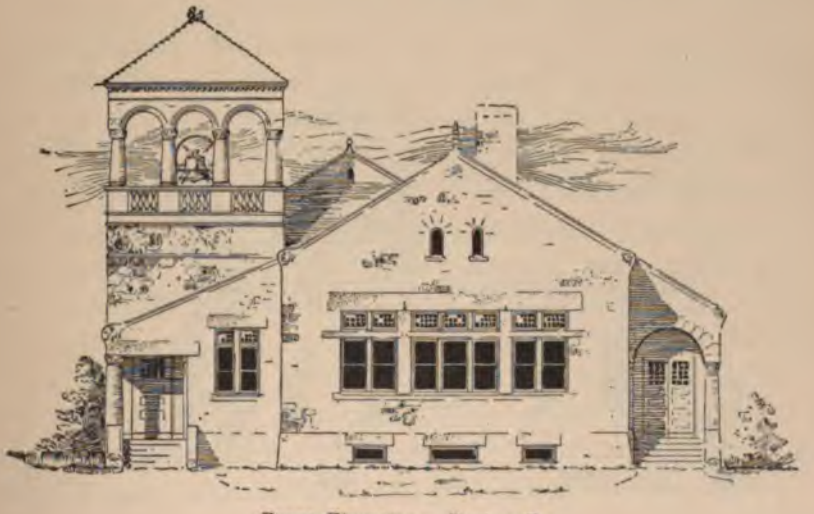
THIS is a school-house of two rooms, with entrances at the opposite sides. The porch, vestibule, and cloak-room at one side is for the use of the girls of both school-rooms, the boys having the same accommodations at the other. As the vestibules are of ample size, the basement is used for the heating apparatus and fuel only. The walks to the playgrounds and outbuildings open from the cloak-room and vestibule in the angle next the main building. They might be protected by roofs at the sides of the rear school-room, forming a kind of semi-enclosed corridors; but this roof is not shown on the elevation. If it should be desired to have the



FLOOR-PLAN.

Of Two-room Stone School-house. Design R.

Perspective View. Design R.



Front Elevation. Design R.

basement arranged for the use of the pupils, stairways may be built in the vestibules, as in the preceding plan, and an outside entrance made at each side.

This building is similar to the one just described, as regards the material and construction of the main walls, except that moulded bricks and terra-cotta are introduced; than which nothing is more effective for decorative purposes or more durable in construction. They are becoming every year more available and less expensive.

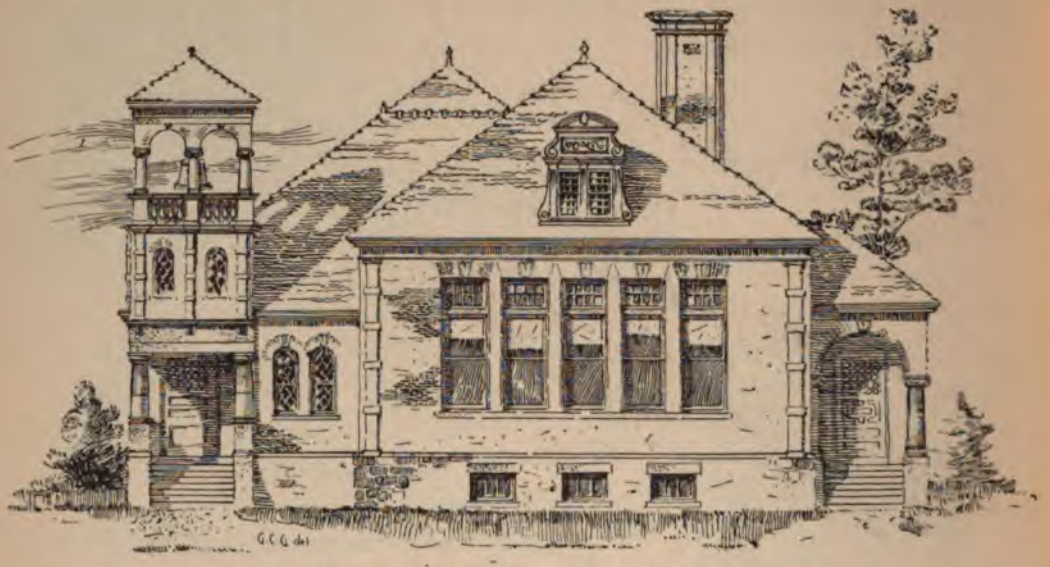
In this building, they are employed for the cornice and copings, for the finials, the crestings, and for all of the bell-tower above the ornamental belt near the level of the main roof. The rest of the walls are of rubble stone, rock or quarry faced; the columns that support the roof of the tower, and those at the corner of the porches, are of moulded bricks. The bases and the capitals of the tower columns are carved after they are built up; those of the porches are smooth, for the obvious reason that they are much exposed to injury, accidental and mischievous. The latter should also be of hard-burned brick, and laid in cement mortar; they will then be harder than the average building stone.

Side Elevation. Design R.

CHAPTER XVIII.

CHIEFLY CLAY.

THIS is the same plan as that of the last chapter, but is clothed with brick, instead of stone, wherever bricks are to be had—and where are they not? Nothing can be more suitable for building purposes, where both economy and thoroughness are desirable,—of which, also, we may well ask, Where are they not? But there are bricks and bricks, masons and masons. If all the practitioners of this handicraft had the skill and the honor that have made the name for uncounted centuries almost synonymous with enduring honor and excellence, brick buildings, the work of masons, would not be held, as they often are, in doubtful esteem. Bricks that are not half burned, mortar that is mixed with too much sand and dirt, lime that never was calcined, and labor that cannot, by any stretch of charity, be termed "skilled labor," have brought brick buildings into disrepute; and they are not often found, except where it is injudicious to build of other materials on account of danger from fire. Yet nothing is more durable, and nothing is more beautiful, than a wall of well burned bricks, carefully selected with regard to color, and laid by a really skillful workman. For visible work, mortar should always be colored to harmonize with the color of the bricks, or else to contrast pleasantly with it. White mortar invariably and decidedly detracts from the appearance of brick-work, both as regards the



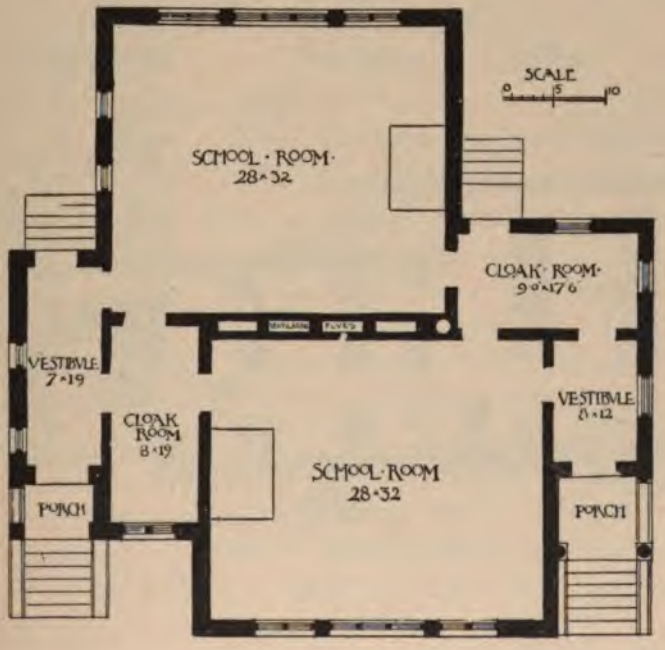
Two-room Brick School-house. Design S.

quality of the bricks and the character of the workmanship, making the joints appear larger, and exaggerating all imperfections and irregularities.

For decorative purposes, moulded bricks are made in any desired form as easily as those of the regular size and rectangular shape; but it is far better to err in the direction of plainness than to indulge in too much decoration. Excessive ornament gives an air not only of ostentation, but of cheapness. Perhaps the most satisfactory form of brick decoration is that obtained by carving the surface of the work after it is laid. For this purpose, bricks of a softer and more uniform texture are made, which are easily carved, and are at the same time thoroughly durable.

The main walls of this building, to the height of the water-table —that is, to the level of the main floor—is shown of stone. As regards strength, nothing can be better than a wall of perfectly burned bricks, laid in cement; and where stone cannot easily be obtained, there is no serious objection to their use for the entire foundation

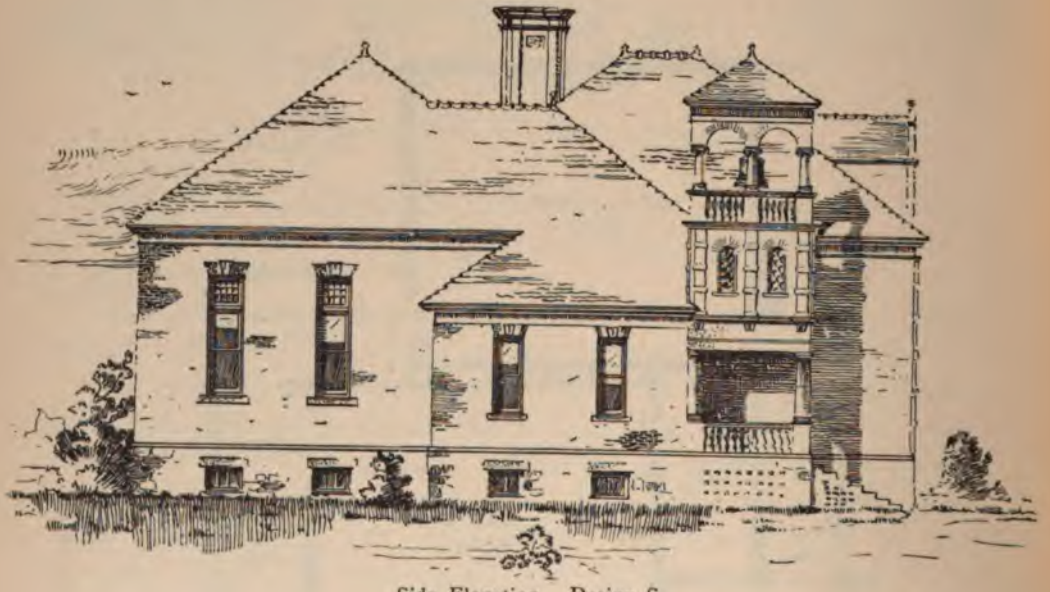
and underpinning of any building. But, bricks being more absorbent of moisture, are more liable to be disintegrated slowly by the action of frost near the ground-line, where there is always more or less moisture. Hence, a base course of stone is desirable. For purposes of utility, it need not be more than one or two feet in height. But the appearance of stone for the entire basement is more satisfactory. This design also shows stone sills for all the windows, stone caps for those of the basement, stone plinths for the brick columns beside the porches, and stone lintels for the support of the masonry of the bell tower. These lintels might be of iron; in which case they should be of shape and design suitable for that material, and not an imitation of stone.



FLOOR PLAN.

Floor Plan. Design S.

The crestings, ridges, and finials are of terra-cotta, which is not extravagant in cost, or unsatisfactory in use for such a building. The same cannot be said of the attractive-looking roofing tiles that are coming slowly into use, but which do not, as yet, promise the desirable union of durability and economy.



Side Elevation. Design S.

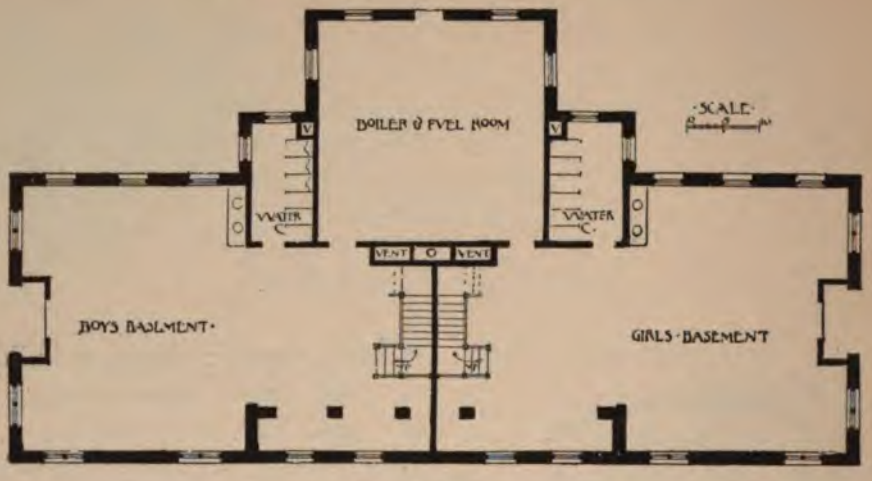
CHAPTER XIX.

SAFEGUARDS.

THIS chapter shows a building for three school-rooms, two of equal size, and a third somewhat smaller, between and behind them. In none of these plans is the exact size of the rooms considered important. In this case, if the two larger rooms will accommodate forty-five or fifty pupils, the smaller will hold thirty-five or forty. There are two large cloak-rooms, the one at the left being for the boys in the two rooms that adjoin it, the other for the girls in the two adjoining rooms. Of the two small cloak-rooms, the one at the right is for the girls in the room at the left, and the one at the left for the boys in the room at the opposite end of the building.

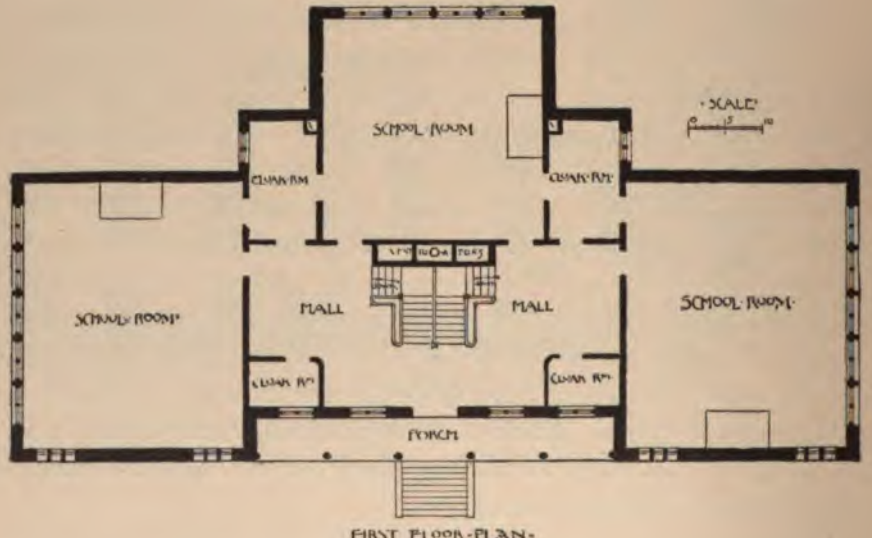
The basement is well above ground, and is for the common use of the school; except the room at the rear, which contains the heating apparatus; and the water-closets, which are in separate rooms under the larger cloak-rooms. Each of these has two windows and a special ventilating-flue, the large ventilating-shaft for the school-rooms being in the centre of the main building.

The presumption is that this building will be warmed by steam or hot water, in the manner recommended in previous chapters; that is, the warm, fresh air will be introduced into the rooms through pipes



BASEMENT PLAN.

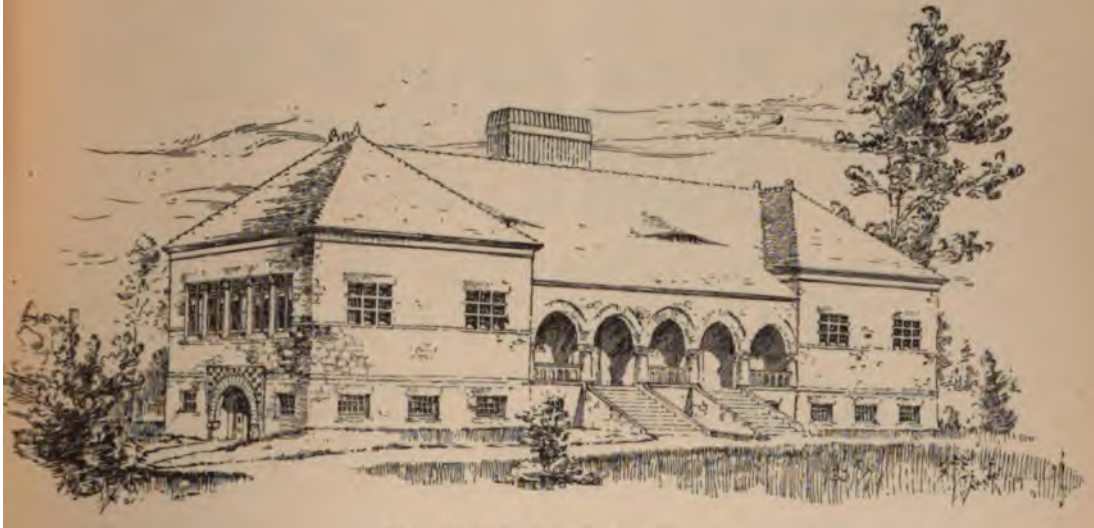
Design T.



FIRST FLOOR PLAN.

Design T.

opening into the rooms near the ceiling, and the foul air withdrawn through the openings near the floor, and as nearly as possible under the place of its entrance. In this case, the best results would probably be obtained by placing the radiators for each room directly below the platforms, carrying the vertical heating-pipes against, or partly in the wall behind the teacher's desk, and exhausting the foul air through openings in the front of the platforms, the foul air-ducts being carried horizontally under the floor, that is, overhead in the basement, to the large, warm ventilating-flues in the center of the building. Of these three separate flues,



Perspective View. Design T.

one for each of the school-rooms, the central one will be sufficiently warmed if the smoke-pipe from the boiler is placed within it; the others should be heated by steam or hot-water pipes, in order to ensure a constant and strong draft.

It is sometimes urged that under no circumstances should the water-closets of a school-house be placed in the basement, and there is no doubt that, in the majority of cases, experience is against this arrangement; yet there is no sufficient reason why it may not be safely

adopted in cases where the expense is not an objection. Unless, indeed, the common difficulty of securing faithful workmanship and the thorough execution of what is attempted, is considered a sufficient reason for abandoning a desirable end. If the walls of these rooms are of hard bricks, smoothly plastered with cement, a thin coat of asphaltum applied and painted some light color; the ceilings first

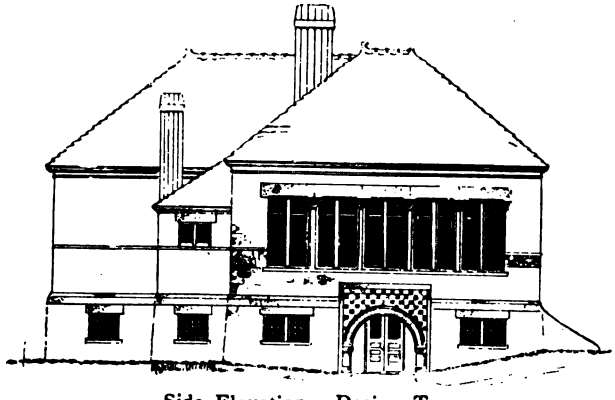
Front Elevation. Design T.

sheathed and then lathed and plastered and also painted; or, better still, covered with flat brick arches and treated like the side walls, the floors being of asphalt concrete; the rooms will then be practically air-tight. Guarded in this way, any sewer-gas that should find its way into them, or other foul air contained in them, could not escape into other parts of the building except through open doors. It is, however, indispensable that each of these rooms should have an ample ventilating-flue, the two having no connection with each other or with the central ventilating-flues, and warmed at all times and all seasons of the year. Thus protected, there is no danger that they will contaminate the basement or other parts of the building; in fact, if they are properly constructed and kept in good order, there is no objection to their being placed as shown in this plan.

It will readily be seen that another story could be added to this building, duplicating the school-rooms, making six in all, with accommodations for two hundred and fifty or three hundred pupils. If that were done, the capacity of the water-closets should be somewhat

increased; but no other change would be required, the stairs to the second floor being directly over those shown on this plan.

The exterior design is plain and massive, but so simple in detail that it is not necessarily expensive, especially in a region where building-stone abounds. The small mullioned windows at the front end of the two large rooms are a concession to outside appearance, not strictly necessary for the lighting of the rooms. Still, they would make themselves useful in very warm weather, or when it is desirable



Side Elevation. Design T.

to "flush" the rooms by opening all the windows and letting the wind sweep through them. They would not be allowed to let their light shine to the inconvenience of the scholars who face them, being always covered by blinds or shades. Of course, the same interior arrangements might be enclosed by brick or wooden walls above the basement. That should be of bricks or stone.

CHAPTER XX.

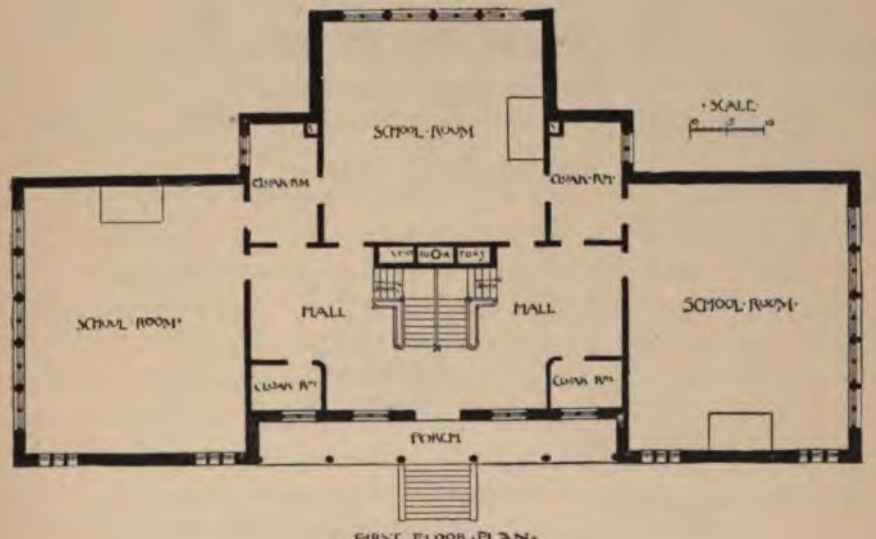
DESIRABLE FORMALITY.

IT was suggested in the last chapter that the three rooms of that plan might be doubled by lifting the roof and keeping the same arrangements in the second floor as in the first. With slight changes in the windows and in the exterior detail, that is the evolution of this design. By reason of its long outside galleries on both first and second floors this building would perhaps seem somewhat more at home in Italy than in our less romantic country, but as we really appear to belong to every tribe and nation under the sun, it is evident that we have a right to adopt all that is best in other nations and, if possible, make it at home with us.

Being the only cosmopolitan people on the globe, our national architecture, if we ever have one, will necessarily be composite to the last degree. Not, it is to be hoped, in the manner that prevails to such an alarming degree at present, and which consists in loading one poor building with all the tricks of architectural fancy that have ever been invented; nor yet in applying some one style, "Queen Anne," Romanesque, Colonial, Moorish, Renaissance, to every sort and kind of buildings, from religious temples to cotton factories,

merely because fashion happens to desire it; but by thoughtfully applying to each building the style that is best adapted to its use and condition.

It is evident that the more formal, symmetrical styles are, in a general way, most appropriate for school-houses that contain several rooms of similar size and shape, and which require practically the same accommodations in regard to space, light, warmth, seats, and in all the minor working accessories of the school. There is a certain

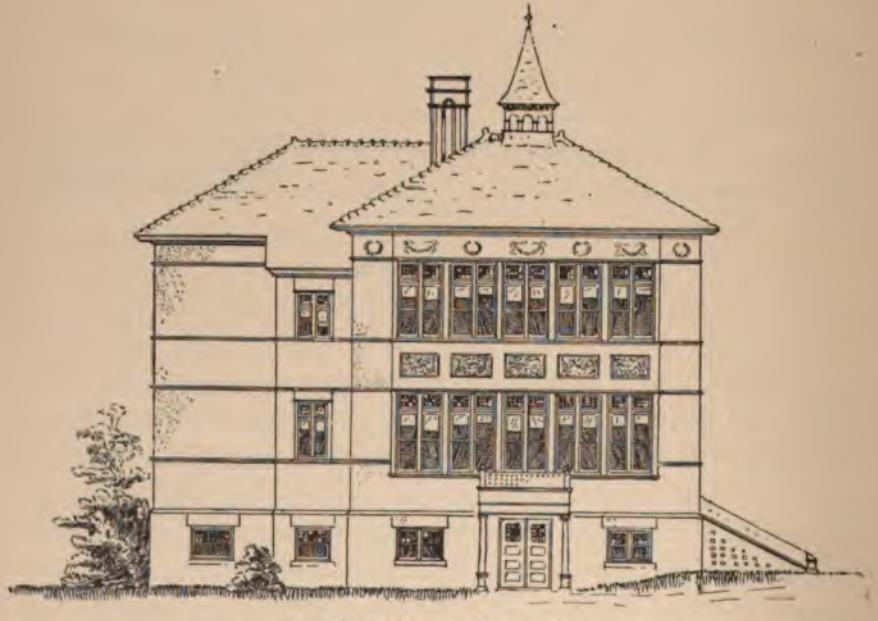


FIRST FLOOR-PLAN.

Of Designs T and U.

manner of grouping half a hundred children in a room for purposes of study and recitation, a certain way of placing their desks, of supplying light and heat, of arranging the entrances and exits, which, within reasonable limits, ought to be closely followed. To deviate from these for the sake of external proportions, or of introducing any peculiar style of architecture, is, in large buildings, to sacrifice essentials to non-essentials. The case is quite different in those of smaller size where the form of the roof, of the porches and other purely

Front Elevation of Design U.



End Elevation of Design U.

external features, are the chief elements in the design. For such a picturesque composition may be adopted without affecting the interior.

This building, like many others among these designs, is represented as standing upon a site that admits entrances from different levels; those at the side or rear leading to the basement, the main front entrance being at the level of the first floor. This arrangement does not require a sloping lot originally, but on the contrary a level one, the difference of altitude being produced by bringing the earth removed for the foundations, and for such portions of the basement as are below the surface, to the front side of the building.

Another general suggestion may be made in this chapter that is equally applicable in other cases. For summer ventilation it is indispensable that there should be ample openings at the top of the rooms, preferably in the ceilings, up through the roof. For this purpose the same flues that furnish the cold weather ventilation may be used, by a proper arrangement of the ducts and valves; in gabled roofs, openings at opposite ends protected by louvres will answer, or the stock patterns of metallic ventilators may be more convenient and efficient than either. This plan has ventilating turrets which are supposed to add somewhat to the architectural effect while serving their important practical end. The one thing which is always useless and sometimes worse is making a large opening through the ceiling into a close, unventilated attic.

CHAPTER XXI.

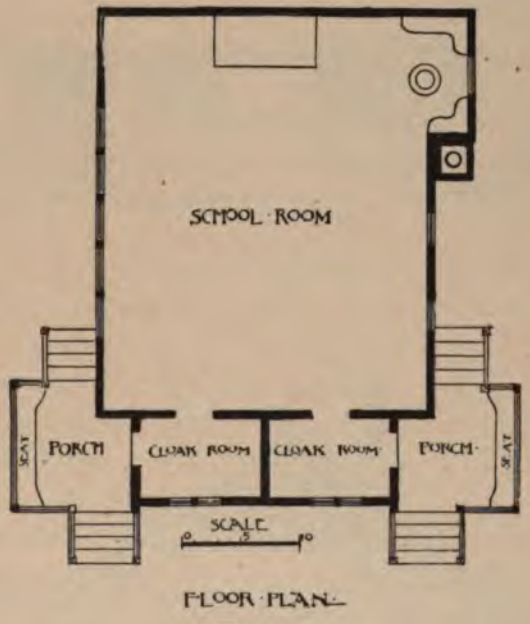
A CARDINAL VIRTUE.

THIS small plan is introduced again, being the same as that of Chapter V., to serve as a text for some observations that are applicable to all buildings of every degree and kind. There is one quality which no school-house of town or country need ever be without; a quality that was held in high esteem in apostolic times and has not yet lost its rank. We cannot all be great, but we can all be good; likewise it may be out of the question for us to be grand; it is certain that we can all be clean, and cleanliness is next to godliness. How true it is that the most precious, potent and valuable things in the world are the most easily obtained.

"'Tis heaven alone may be had for the asking."

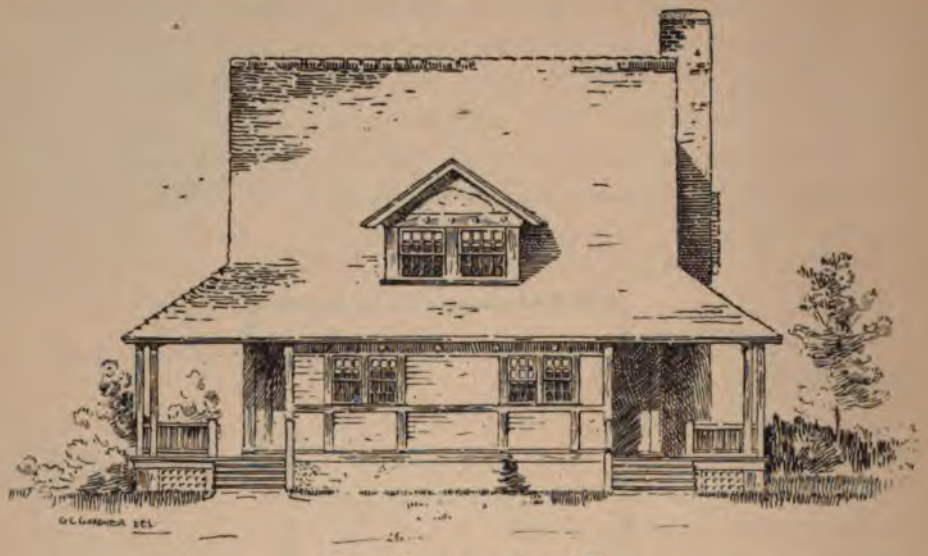
There is not one of the humblest of the remote and antiquated country school-houses that still stand, silent reproaches to the boasts of modern civilization, nor a far-away structure in the log-cabin regions of the pioneers, which in this, the most excellent of all the material, visible virtues, may not stand proudly on a par with the highest of the high schools in the richest and most lavish communities. And cleanliness is a thousand times better than grandeur, for there is no estimating the value of the discipline, intellectual and moral, that will

result from spending a few hours every day amid surroundings, no matter how simple, and in an atmosphere of absolute cleanliness it is just as impossible that a sensitive child should be subject to this influence and not derive sure and positive strength from it, as it is that a water-lily can refrain from opening its white and gleaming petals when it has risen to the life and light of the pure, fresh air and sunlight.

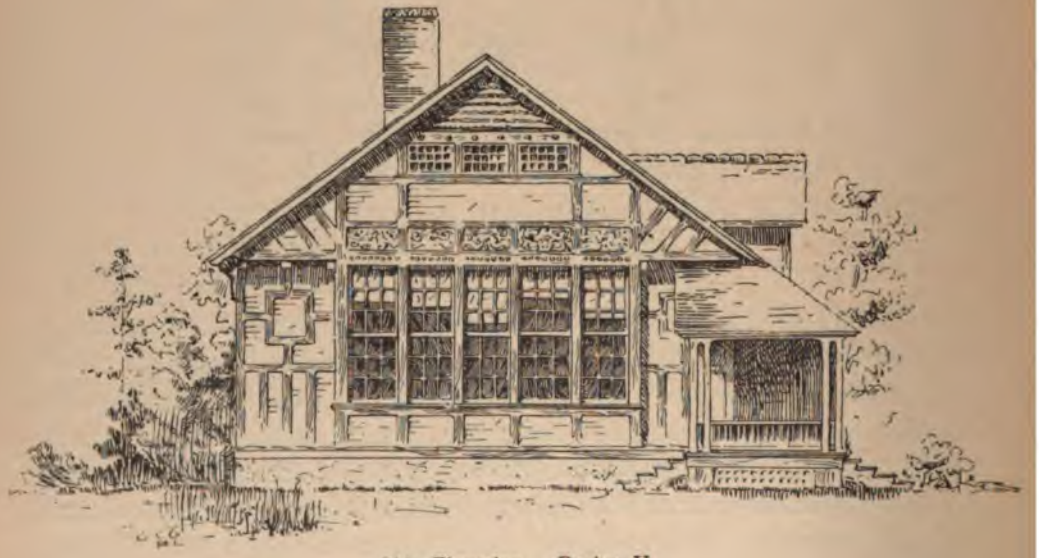


Design V.

Cleanliness in the school-room is always possible, nay, more; the lack of it is inexcusable. There are no claims of regular recitations, formal discipline, or even of that chief of all good habits, punctuality, that should not be made to stand aside for cleanliness if need be. Cleanliness should pervade every part of the premises, starting with the walk at the front gate, rising through all the halls and stairways, enhancing the dignity of the teacher's desk, shining upon those of the pupils, looking out through the windows and permeating



Front Elevation. Design V.



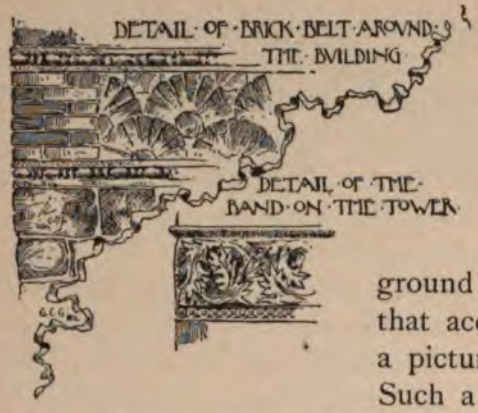
Side Elevation. Design V.

every rod of the play ground, even to the remotest corners of the outbuildings.

Is it not true that the benign influence of such a spirit of cleanliness would be beyond all computation, and that it ought to be obtained at any cost? So I have thought it best to refer again to the desirableness of making all interior finish smooth, simple, and of such shape and quality as to be kept clean easily, and to repeat the suggestions in connection with one of the simplest designs. Large and costly buildings are expected to be taken care of as a matter of course, those of humbler character are liable to be neglected; hence the greater need of making their care easy. All projecting corners should be avoided, and as far as possible sharp inner-angles that will hold dust and dirt. The baseboards and wainscot, instead of forming right angles with the floor, should be finished with a curve; the architraves around the doors and windows should be free from deep incisions, "quirks" and grooves, and any unavoidable projections should be made slight and of such shape that if dust lodges on them it can be readily removed. Even the window sashes should be without fine mouldings, and the nearer the panels of the doors are to forming a plane surface the better. The doors themselves should be as light and as strong as possible, and to that end it is better that they should consist of many small panels rather than of few large ones. These things seem to be trifling matters, but taken together they go to make the difference between well and thoughtfully planned work and that which is the reverse. There are, indeed, matters of much greater importance, but those ought to be done and these not be left undone.

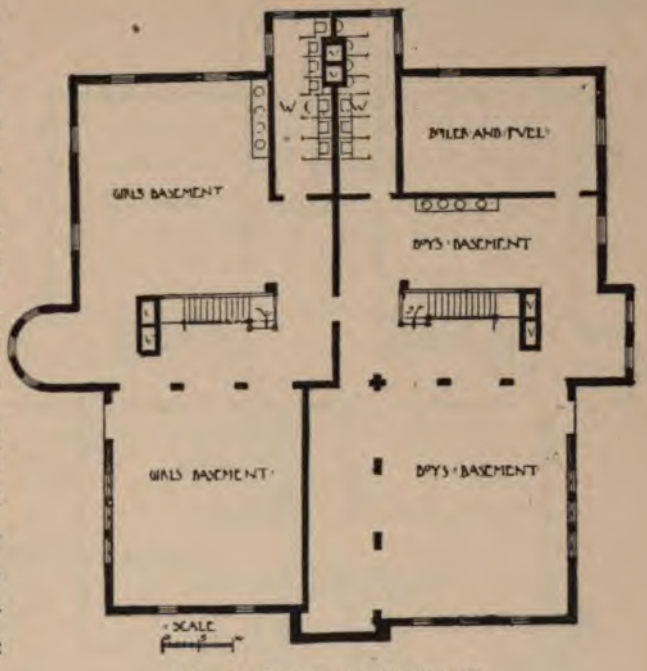
CHAPTER XXII.

MINOR CONCESSIONS.



THIS chapter illustrates a building for eight similar rooms for forty-five or fifty pupils each. The only deviation from exact identity of size and shape is made for the sake of giving a slightly varied outline to the ground plan of the building, which, on that account, lends itself more readily to a picturesque treatment of the exterior. Such a license is justifiable when there is no loss of convenience or of the essential requirements of actual use. The principal lighting of the rooms is from the long side at the left of the seats of the scholars. The rows of the seats and desks, as they face the platform, are crosswise of the room, thus keeping them in the most compact form and most directly in range of the teacher's oversight. The cloak-rooms are large and well lighted, each one serving for the boys or girls of two rooms. There are two separate staircases; the doors from the halls to the cloak-rooms, and between the cloak- and the school-rooms, are arranged to give the greatest simplicity to the movements of the school. The basement is arranged for the use of the pupils, whose ordinary entrance and exit is through that part of the building; and there is a main front entrance for teachers, visitors, and for special occasions.

This building is perhaps a reasonable illustration of what may

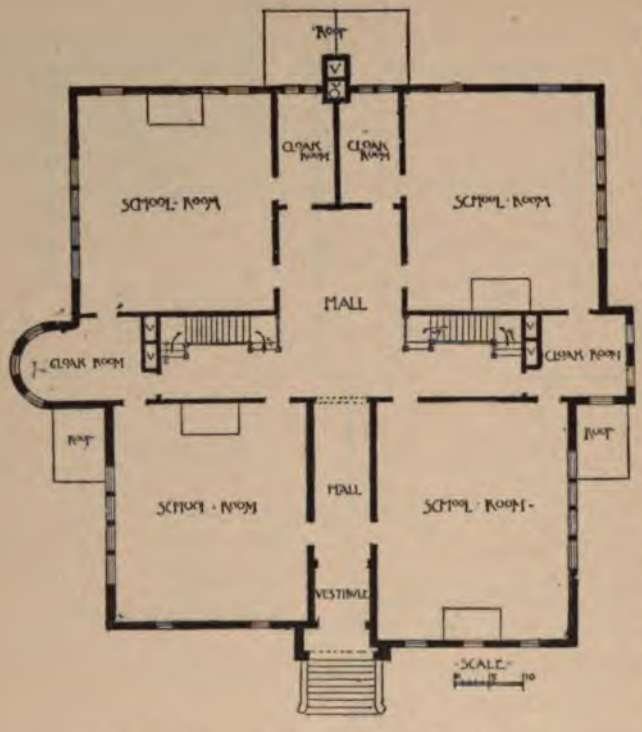


Plan of Basement. Design W.

fairly be conceded for the sake of external appearance, and may serve to open the question, which can never be positively answered, as to how far minor points of utility may be sacrificed for the sake of a fair exterior. As in the preceding chapter, the introduction of the small windows in the front of the building is a deviation from the straight and narrow path of scientific planning, which prohibits light from more than one side of the school-room. But, as I have said, if these windows have inside shutters with rolling slats, the objection to them as regards cross-lights in the room is removed; while outside they give an appearance of life to the front elevation, which nothing but actual windows can ever give to an occupied building.

It is not necessary that the front rooms at the right of the hall should be longer than those at the left; but the extra two or three feet do no harm, and this slight projection gives the desired irregularity in the ground-plan. Other illustrations might be given of features that may be called unnecessary and of doubtful utility. But it is not easy to draw the line that separates necessity and utility, in their narrowest sense, from the higher needs and uses of æsthetic fitness and a reasonable demand for visible beauty

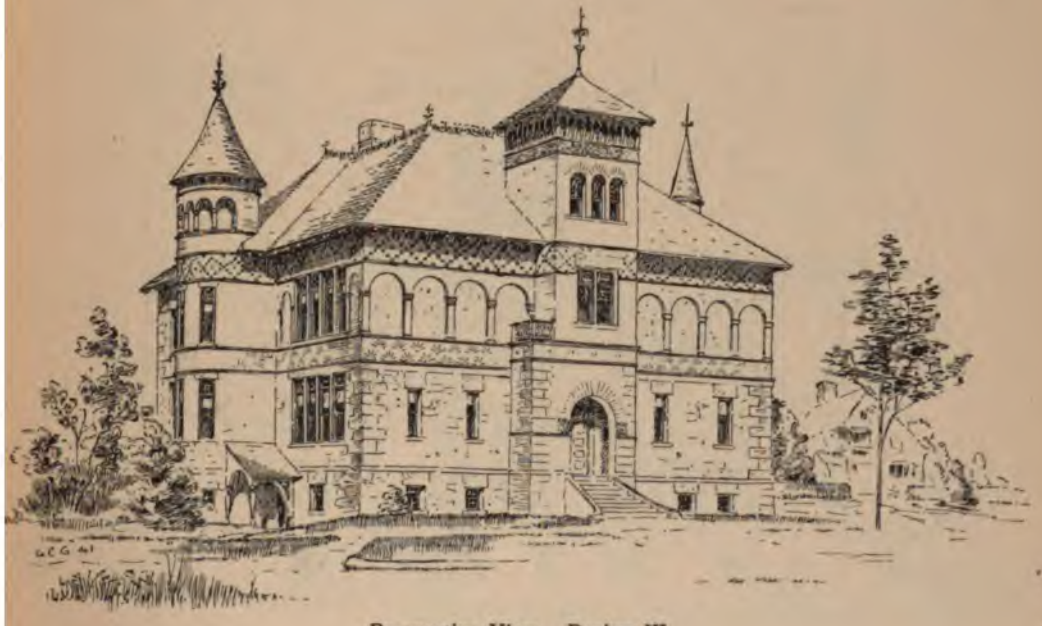
If we accept the average modern school-buildings as examples both of



First and Second Floor Plans. Design W.

economy and utility, it is absolutely certain that beauty costs no more than ugliness. Yet it is not true that a building which supplies the essential needs,—so many cubic feet of space for each scholar, so many degrees of heat, so much fresh air per minute, and so many square feet of window-glass,—will be as beautiful if put together in the most economical manner possible, regardless of its outer appearance, as it may be made by an added expenditure wisely applied for the sole purpose of increasing its external beauty. The lamp of sacrifice must surely be lighted before the steady flame of enduring beauty can be kindled. In the case of the school-house, however, it must be the sacrifice of a larger appropriation both of thought and of money, and not a sacrifice of anything that is needed to ensure the safety and comfort of the occupants of the building. Picturesque composition must not be purchased at the expense of illy-shaped rooms; charming groups of windows are not worth permanent injury to the eyes of the children; massive effects and Richardsonized Norman architecture are too dearly bought, if an increase of dampness and darkness is the price paid; an interesting adjustment of gables and artistic skylines

are greatly to be desired; but smoking chimneys, damp walls, and leaking roofs are still more earnestly to be avoided. Essentials must never be sacrificed for non-essentials. But while it is true that a building constructed in the simplest, most economical manner possible, cannot, even by the utmost exercise of good taste and careful study, be made as graceful in its proportions and in effect as beautiful as one on which a part of the outlay is applied to secure satisfactory form

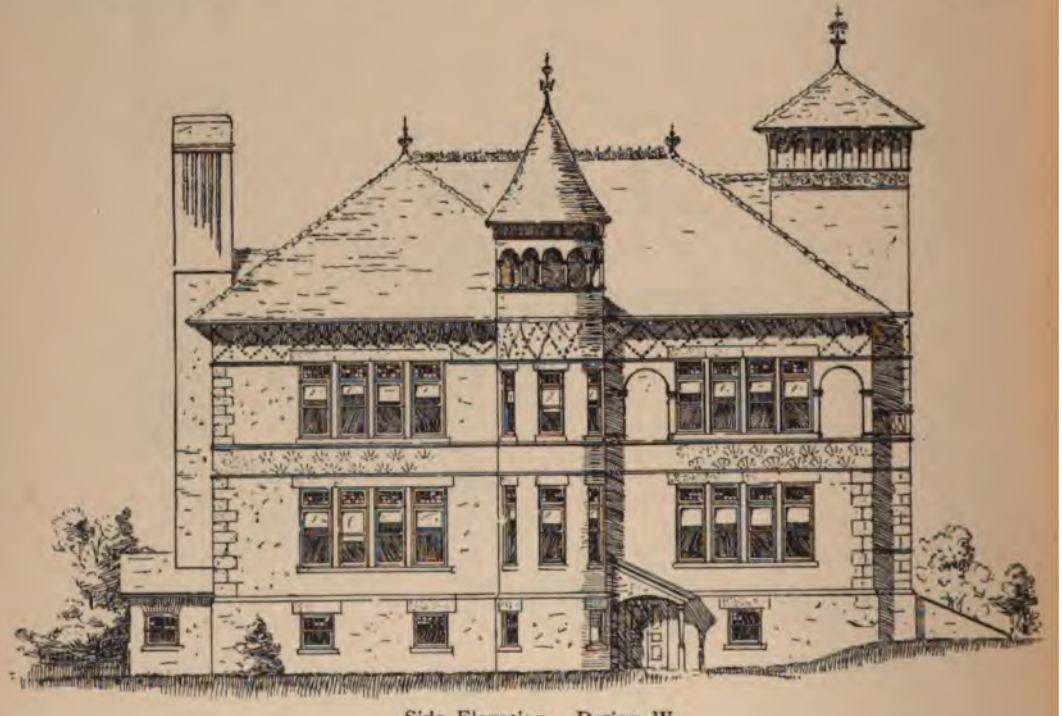


Perspective View. Design W.

and proportion (to say nothing of appropriate decoration); it is equally certain that without going beyond the needs of actual construction and the limitations of the strictest economy, it is always possible to design an exterior that shall have the merit of being inoffensive, and of possessing the dignity that always appears in work that is well and honestly done.

The most grievous and inexcusable fault in the way of exterior

design appears in those buildings upon which there is a large outlay that is worse than thrown away. How or when ostentatious vulgarity in the visible structure of public and private buildings ever came to be considered 'architecture,' is beyond comprehension. It is not poverty of resources that is responsible for the deplorable, not to say unendurable, appearance of many of our conspicuous school-buildings, but



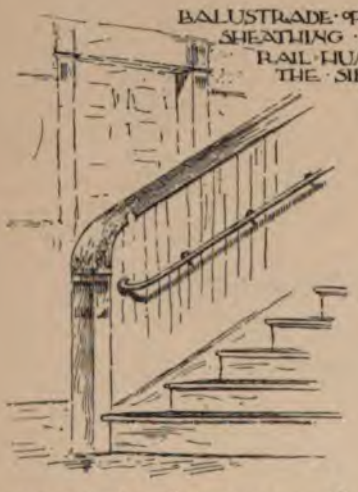
Side Elevation. Design W.

ignorance and vanity. Much less is the lack of pecuniary means the chief cause of imperfect lighting, heating, and ventilating, but still ignorance; or worse yet, because more difficult to enlighten, a stupid indifference and conservatism concerning the importance of these things; the feeling that what has been good enough, though in fact it never was anything but bad, is good enough still. It is a common thing to find modern school-buildings of much approved and

boasted excellence, from which many essential needs have been omitted ostensibly on account of their expense, while upon the same buildings, far greater sums than these same essentials would have cost have been expended for outside display that is not merely useless, but positively offensive.

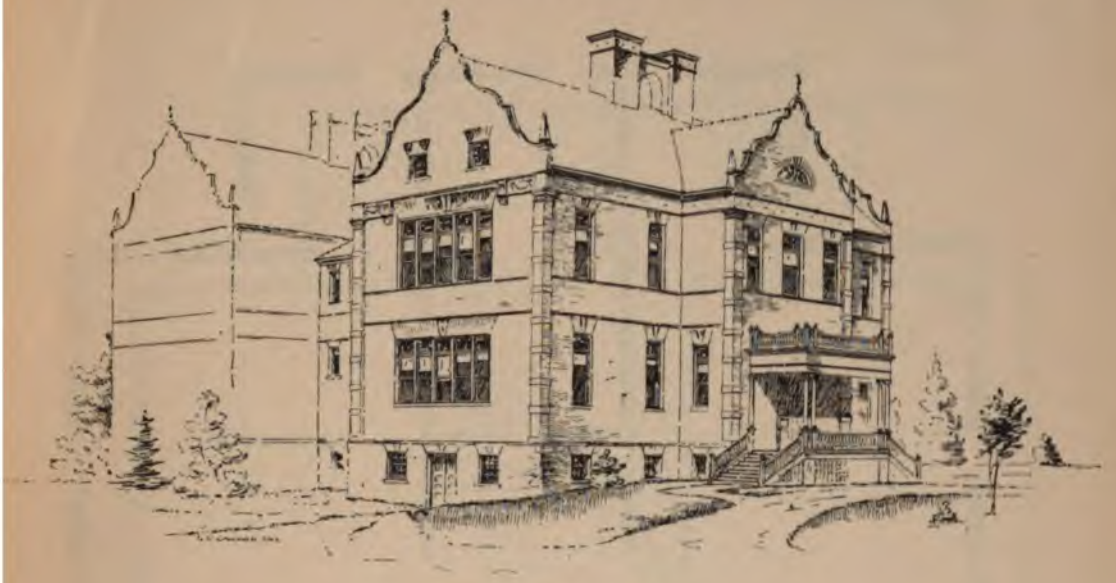
CHAPTER XXIII.

ROOM FOR GROWTH.



IT is a common experience in cities and villages to find the number of pupils in certain districts or wards increasing with a regularity that can be easily estimated for any given time. How far to anticipate the future in the expenditure of public funds is always a vexed question. Ordinary business prudence, which is perhaps rare enough in the administration of public affairs, would at least dictate that there should be reasonable forethought in the way of securing land enough for future growth, and that when it is clear that additional room will be required in the building within a few years, it is also well to arrange the plans necessary for immediate use so that additions may be made at any time with the least possible sacrifice, either of convenience or in the tearing down and alteration for the purpose of building larger.

There are two ways in which such provision can be made, as regards the building itself; the one by arranging a floor plan that will admit of future growth horizontally, without interfering with the parts already completed; the other by constructing the main walls and arranging the interior of a one-story building so that one or more stories may be added at any future time without changing the first story or enlarging the area covered by the original structure. Gen-

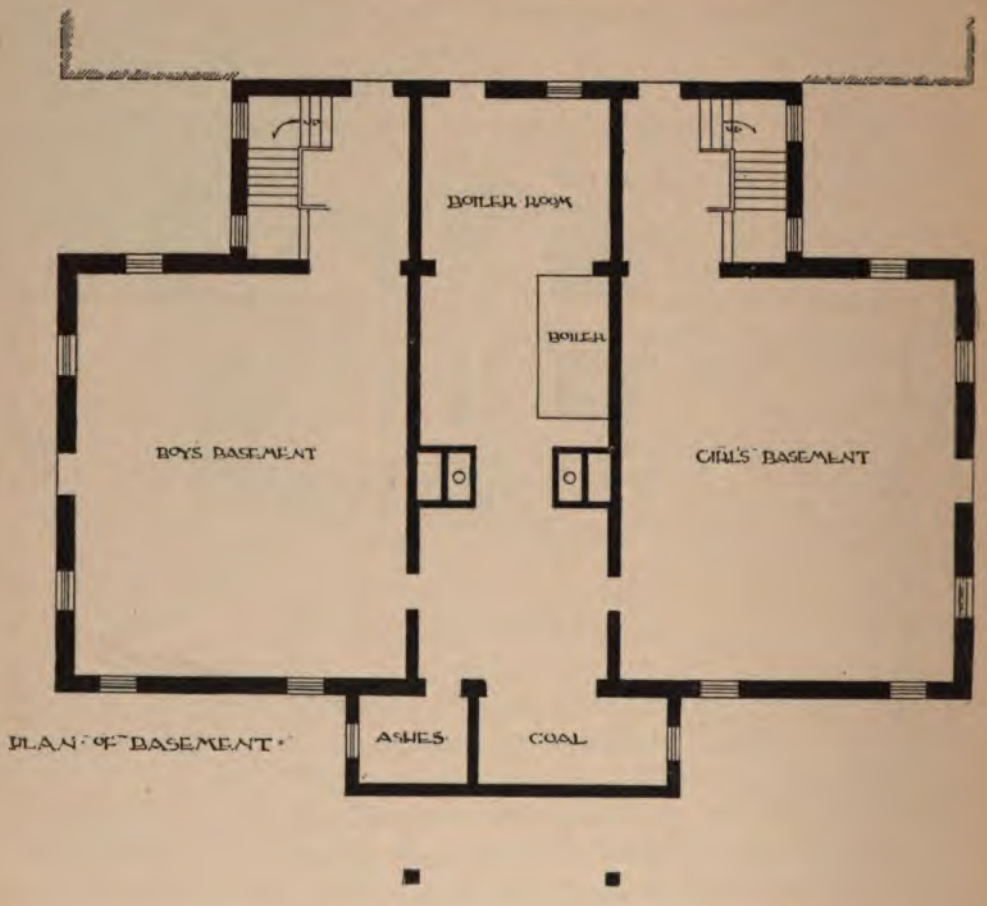


Perspective. Design X.

erally speaking, the most economical method, as regards present expenditure, would be to make the building of the required height, enlarging it by the addition of wings at the sides or rear.

The plan shown with this chapter is for a building two stories in height above the basement, and having originally, two school-rooms on each floor, with the necessary hall, stairways, wardrobes, and a small room for each of the teachers. The children all enter at the basement, the boys at one side, the girls at the other. There are also doors at the rear of the basement, and a front entrance to the first floor.

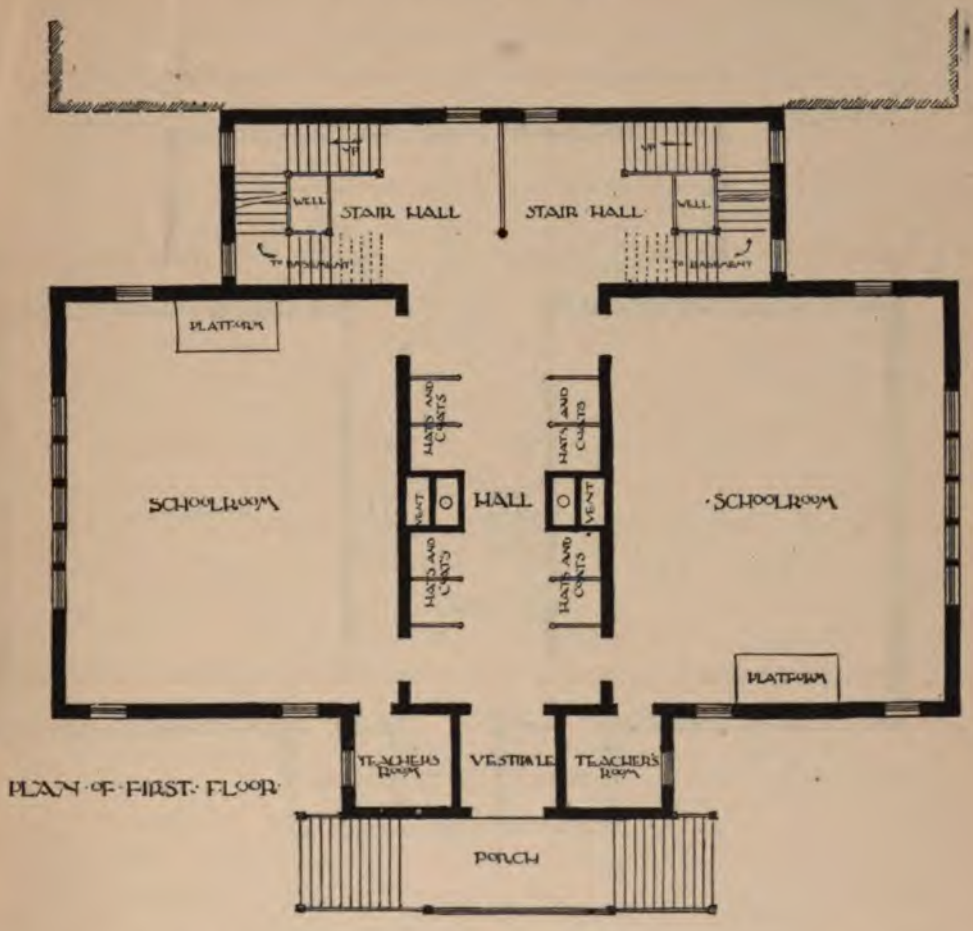
In this plan I have adopted the arrangement, sometimes preferred to any other, of making small wardrobe closets in the main hall, enclosed at the sides only by partitions six or seven feet in hight, those at one side being for the boys, the others for the girls. These wardrobes contain an aggregate length of wall space sufficient to give each of the pupils a distance of one foot. The best arrangement is



PLAN OF BASEMENT.

to divide these spaces by narrow partitions forming shallow alcoves, thus separating the clothing of each pupil from that adjoining; in the bottom of each alcove there should be a shelf for overshoes.

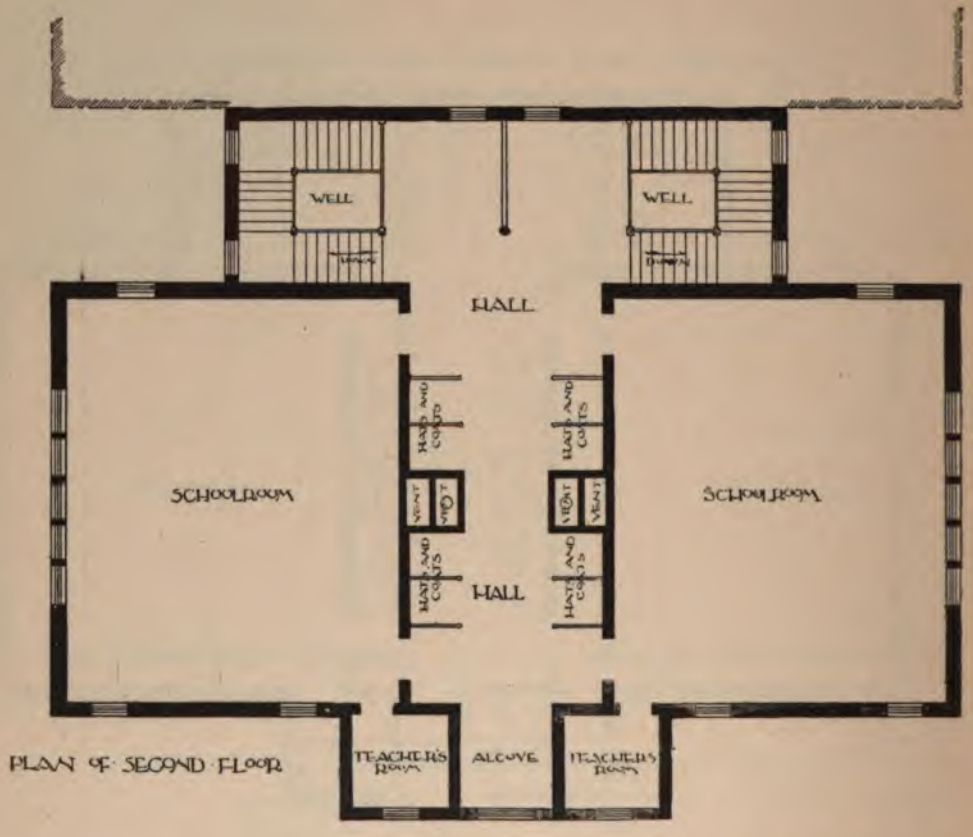
Whether this provision for the outer wraps is better than detached cloak rooms, as I have shown on many of these plans, is an open question, depending on various circumstances. There are good reasons for and against both plans. It may be that usage would be a sufficient reason for adopting one or the other; the age of the pupils, their general character and conduct, the liability to trespass from out-



PLAN OF FIRST FLOOR

side should all be taken into account, as well as the cost; for, other things being equal, the arrangement shown on this plan would involve less expense than that of providing separate cloak rooms.

As the matter is an important one and liable to be misunderstood, it may be well to repeat what has already been said in other chapters, that in the main school-rooms all windows except those at the left of the scholars' desks are for occasional use only or for assistance in summer ventilation. It is imperative that the broad light should be



PLAN OF SECOND FLOOR

as far as possible in a single mass, that is, unbroken by wide piers, and that it should be ample without the aid of light from any other side of the room. The ventilation and warming would be similar to that described in former chapters, where steam or hot water is used.

It is proposed to enlarge this plan by duplicating the main building behind the extension that contains the stairways. The stairs that are shown would thus serve for the whole, and the only change requisite when the addition is made would be the conversion of the windows at the end of the staircase hall in the different stories into doors or wide openings. If provision is made for this when the first

structure is built, this change would be of trifling moment. The basement doors to the play grounds would be at the rear of the addition, and the teacher's rooms, if desired, might be at the back end of the central hall.

It is evident that this building could be extended indefinitely, because the same floor plan, and the same style of the exterior treatment, would suit a building of three stories above the basement, that is, a three-story building of three rooms.

Still another variation might be accomplished by adding a third section of the same general character, making twelve rooms in a two-story building; this would require another staircase between the second and third sections. The propriety of assembling so many children in one building I will not now consider.

This plan is intended to suggest one solution of the problem that is constantly occurring in towns and cities in which there is a steady growth, not only of the total population by the extension of the borders, but what is in most cases to be deplored, an increase in the density of population. The present tendency of cities to increase at the expense of the country must be accepted as one of the uncontrolable social phenomena of the age. It is apparently useless to try to stay it even if it is, in fact, what to many it appears to be, a serious evil; but perhaps something can be done to diminish the obvious dangers that accompany it. Beyond doubt the children are the greatest sufferers. Healthful, happy child-life is instinctively associated with the freedom that is only possible in the country. The few weeks, and for the great majority the few days, of real country life that they are permitted to enjoy during the year are of little value except as a bit of happy memory or of joyful anticipation. All the more reason is there that the grounds around the city and suburban school-house should be made as ample as possible. The interest in public parks that seems to be gaining strength in all modern cities is most encouraging; it would be a still more hopeful sign of progress if cities that are growing in size, and towns that expect to become

cities would, before appropriating space for extensive parks for general and ornamental purposes, secure large tracts for the public schools, so that every school-house might be itself the center of an ornamental park. There would then be no danger but the parks would be frequented by those who need them most, that is, the children,—no danger but the school-house would be an attractive place.

CHAPTER XXIV.

CONCERNING ALTERATIONS.

WHEN we consider the hundreds of thousands of school buildings all over the country, in the older parts as well as in the newer, of which, if the opinions of the school-boards and others who are supposed to be competent judges are correct, not one is what it ought to be,—and only a small percentage even of those most recently and most expensively built are without serious faults,—the first impulse is to set these existing buildings right before we build new ones. Many of the smaller, cheaper buildings, by simple changes and additions, can be converted into well planned structures, having all the essential features that belong to the most carefully studied plans; that is, good light, fresh air, suitable provisions for warming, and decent privy accommodations. Easy—that is, it is easy where there is sufficient general intelligence in the community to perceive the need of these things. There is rarely a cheap building either of wood or of brick, in which windows cannot be opened at a trifling expense at one side of the school-rooms, which will afford proper light; there are school heaters, in effect small portable furnaces, that only ask a place to stand, and they will not merely warm the air in the room, but will give it the necessary circulation for thorough ventilation; if there is no suitable ventilating-chimney, one can always be built on the outside of the main walls when a convenient place inside cannot be found; there is always room in the floor for openings for the escape of foul air and for ventilating-ducts underneath it; and the raising of a building one or two feet will perhaps change it from a damp and unhealthy condition to a dry and healthful one.

Such amendments of harmful conditions will rarely injure the external conditions of a building, and even if that should follow, it would be of slight consequence when the welfare of the children is at stake. It often happens that the "making over" of a dwelling-house is accomplished at great pecuniary disadvantage, even to the extent of costing more than an entire rebuilding. But the modifications above suggested for a school-house of one or two rooms would be slight, in comparison with the radical change of an ordinary dwelling. If the ceiling is of suitable height for the size of the room and its adequate lighting; if the frame is sound and the roof in good condition; the site dry and otherwise desirable; a very small proportion of the cost of a new building will often make the old as good as new, in all that is really essential. If anything can be afforded for outward appearance, the addition of vestibules and porches can easily be made to serve the double purpose of adding to the comfort of the building as well as to its outward beauty In the case of large buildings of many rooms and more complex arrangements, there is, of course, a far greater proportion of loss in any attempt at reconstruction.

CHAPTER XXV.

CONCERNING VENTILATION.

THERE is no doubt that the importance of the thorough ventilation of school-rooms is well understood by intelligent people, especially where public schools have been maintained for several generations, and attendance has been compulsory, either by statute law or by the still more inexorable ruling of public opinion. From the early days of box stoves, in small, crowded rooms, when some sanitary enthusiast would occasionally try to frighten the school committee of his town or district by citing the black hole in Calcutta and other fatal examples; to the latest scientific declaration that the air in the majority of large school-buildings is far more unfit for respiration than that of the average sewer; there has been a growing conviction of the necessity for checking this modern slaughter of the innocents by means of slow poison, administered in the form of disease germs, and other atmospheric impurities. There is no lack of popular demand for fresh air; but the popular notions as to the best method of securing it are extremely vague and various. The subject has been so much involved with abstruse scientific discussions of the chemical properties of the fluid we inhale, and nice adjustments of physical laws and their operations, which none but experts can be expected to understand; and, withal, so much obstructed by attempts to control this one free element by patent appliances, which, by the very fact of their being patented, provoke distrust; that the chances of strangulation seem to be about as immanent as they ever were. Yet the whole matter is as simple as the running of water: at least as much of it as needs to be understood by those to whom its practical

application is entrusted. He who can understand the mechanical operation of a common pump and the weighing of a pound of nails in a balance has the essential elementary knowledge requisite for comprehending the science of ventilation and the art of applying it. It is not necessary to know precisely what makes the air in a close room full of people unfit for respiration. Once imagine the occupants submerged in a large tank of water which each one is constantly imbibing and ejecting; the clothing which they wear being more or less unclean; the cutaneous exhalations going on all the time, some of the number being perhaps in the incipient stage of disease; in brief, imagine the air to be water instead of air, a visible instead of an invisible fluid; and the desirableness of constant change before it has been used over many times will be conceded by the most conservative objectors to fresh air. It is not necessary to know why air expands with heat, nor what becomes of the carbonic acid gas, and why it is swallowed with satisfaction and impunity in soda-water, and yet kills in the famous Grotto del Cano. These things are interesting and important in their proper place, and there have been, at a moderate estimate, several thousand octavo volumes written about them. But their inadequacy as regards practical application is fairly demonstrated by the fact that, in spite of them and their valuable information, the "air in the average city school-house is to-day far worse for purposes of respiration than that of the ordinary sewer." Of course, scientific facts are the basis on which all wise practice must be built, in ventilating school-houses, as in everything else; but it is no more necessary that they should be minutely set forth in a practical description of ventilation than that the morphology of plants should be explained to one who wishes to practice carpentry, or the chemistry of water to a student of navigation.

Certain essential facts are sufficiently well established to be taken as the basis of practical work. For instance—in order to ventilate a school-room properly, from twenty-five to thirty cubic feet of fresh air should be furnished to each individual every minute. That is to say, there should be from twelve to fifteen hundred cubic feet of air

withdrawn from a room that is occupied by fifty people, and an equal amount of fresh air introduced every sixty seconds, in order to preserve a reasonable degree of atmospheric purity. That is the one essential physiological fact. Add to this the equally simple mechanical fact that common air expands about one five-hundredth part of its bulk, diminishing in weight in the same proportion for every added degree (Fah.) of heat, and the whole theory is expounded, concerning which tens of thousands of pages have been written, unnumbered patents have been filed, and endless controversies have been held. Experiments based upon the mechanical fact appear to show that when the air inside a smooth, vertical flue not less than twenty feet long and two feet square is thirty degrees warmer than that outside, the difference in weight will be sufficient to cause the air in the flue to rise at the rate of about three feet per second. A simple application of the multiplication table will demonstrate that such a provision would supply less than fifteen cubic feet per minute to each one of forty-eight pupils. There should be thirty feet; and yet it is a rare thing to find a school-room for fifty pupils, in which a well arranged and constantly operating ventilating-flue two feet square is provided. But one of twice that size is necessary for thorough ventilation. Anything less means ill-health and discomfort for teachers and pupils. It is obvious that an exhaust-flue alone will be unavailing. One might as well try to lift the upper valve of a suction-pump when the lower is frozen down, as endeavor to ventilate a room by ample outlet for foul air, without providing for the admission of an equal amount of pure air. In cold weather, the latter must be warmed before it is admitted, and both inlets and outlets so contrived that there shall be no perceptible draughts from either. It hardly need be suggested that this constant movement and change of the air in the room must be effected as economically as possible. The exact, or even the approximate amount of fuel required to cause the necessary movement of the atmosphere,—for the movement cannot be produced without heat of some sort, natural or artificial,—and to warm the incoming air to a proper temperature, can only be ascertained by

experience, circumstances vary so widely. The above dimensions of ventilating-flues are given rather to indicate the usual inadequacy of ordinary means, than as an invariable rule to be followed. Still, if this point is kept in view, that in order to maintain a tolerable degree of purity in the atmosphere of a school-room for forty-eight pupils, in which there is an allowance of from two hundred to two hundred and fifty cubic feet of space for each one, there should be provision for the entrance and exit of from twelve to fifteen hundred feet of air every minute, and that this will require a ventilating-duct having an area of at least five square feet; this may be taken as a basis for general estimates for rooms larger or smaller.

The aggregate size of the flues for the admission of warm air, whether from steam-radiators, hot-air furnaces, or jacketed stoves, may be somewhat smaller than the outlet, because the incoming air is likely to be heated considerably above the temperature of the air in the room and will, therefore, move more rapidly than the outgoing current. Care should be taken, however, that the incoming air is not excessively heated. The furnace, or whatever the source of the heat may be, should never be allowed to furnish "hot" air. Other things being equal, the best heating apparatus is that which supplies a large amount of air, moderately warmed, and moving slowly.

It would be a great advantage if the temperature of school-rooms, and, for that matter, of all other occupied apartments, could be automatically regulated. We adapt ourselves with almost fatal readiness to the constantly occurring natural changes, and that often without the consciousness that a change has taken place. Moreover, we are so liable to imagine an increase of heat or cold in the atmosphere around us when the only change is in ourselves, that the sensations of the occupants of a room are practically worthless as a test of the degree of heat that ought to be maintained. Such automatic regulation seems impracticable, and the only safeguard against dangerous extremes is frequent reference to the thermometer, an instrument that is absolutely indispensable in every school-room. Indeed, there ought to be two or more placed in different parts of the room;

because, however carefully devised the methods of heating and ventilating may be, they should not be left without constant watching.

Still more difficult is it to determine by actual experiment the purity of the air. We are not more powerless to see ourselves as others see us, than we are to detect by the unaided senses of taste and smell the gradual vitiation of the atmosphere in a close room. The only safety lies in providing a ventilating apparatus that will never sleep, and that can never, through carelessness or ignorance, be rendered inoperative. To this end, two things must be borne in mind; neither the flues that carry out the foul air at the bottom of the room, nor those that admit the fresh air, should ever be closed. When the incoming air is artificially warmed and it happens to be necessary to diminish the amount of heat, this should be done by arranging the ducts so that cold, fresh air may be mixed with the warm to lower its temperature; not by closing the registers, which would diminish the supply of fresh air.

In warm weather, when the transoms of the windows and the ceiling-ventilators can be freely opened, there is no excuse for foul air. It will naturally rise and pass out through these outlets, both of which must be furnished with tightly closing valves, which should never be opened when the room is artificially warmed. If they are, the upward current will counteract the downward draught of foul air, actually checking the ventilation and at the same time wasting the heat.

CHAPTER XXVI.

OUT-OF-DOOR SURROUNDINGS.

FENCE FOR PLAYGROUND

THE one thing to which every public school-house is entitled, whether it stands in the geographical centre of a large country district, remote even from the homes of the children, or upon costly territory in the heart of the city, is plenty of room around it. Whatever theories we may entertain as to the righteous ownership of the soil, there is one claim that cannot be ignored without the immediate and direct retribution that is visited soon or late upon all unrighteousness. Children have a divine and inalienable right to enough of the earth's surface to ensure their healthful, happy growth. In many cities it is probably out of the question to provide anything like adequate room for proper out-of-door exercise around the large school-houses that are already built. Ample play ground for several hundred children must be measured by the acre, not by the foot. It must be assumed, therefore, in discussing the treatment of the grounds around school buildings that there are grounds to be discussed.

The difficulty at the outset, in most cases, arises from the necessity of providing a place for the boys to exercise and pursue their boyish games, and still preserve a neat and ornamental appearance around the building. As a matter of simple common-sense, girls should be expected to require the same opportunities for exercise as

boys. Unfortunately, they are too often satisfied with an amount of bodily activity which, though it might disturb the thistle down, would not seriously impair the beauty and good order of the landscape. But a troop of boys let loose in a field however large, leave unmistakable traces of their presence. If they are sent into the same field day after day for a whole summer, nothing destructible will escape.

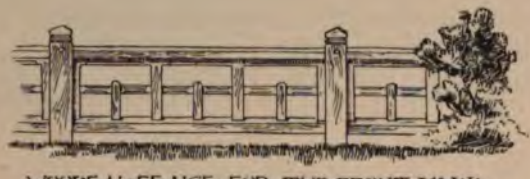
It is therefore an entire waste of time and labor to attempt to maintain ornamental turf, flowers, shrubs, or even shade trees in the

BROKEN · SKY · LINE · FOR · PLAIN · FENCES

midst of the ground distinctly devoted to marbles, ball, shinney, hop-scotch, tag, and the countless games of school-boys.

It simply compels them to a sort of vandalism, which is as damaging to their proper training as it is to the objects of their destruction. If it is a question of choosing between his bodily exercise and the preservation of ornamental shrubbery and smooth, clear walks, the physical instincts of his nature, which are at present the strongest incentives to conduct, will inevitably prompt him to sacrifice the ornaments. The choice ought not to be prematurely forced upon him. Still there is no doubt that all village and country school-houses, and those of the city as well, if possible, should have the civilizing influence of beautiful natural surroundings. This means at once two entirely separate departments of the exterior ; one to be given over ut-

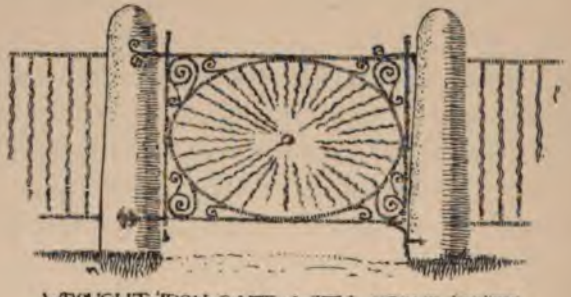
terly to purposes of out-of-door exercise, and which has no features or contents of any sort that are incompatible with these purposes; the other to be kept in the perfect order that landscape beauty requires.



WOODEN FENCE FOR THE FRONT YARD

IRON FENCE ON A STONE BASE

Naturally, the latter will be in the front of the building and the play ground in the rear, where it will be as much out of common observation as possible. Not that it should by any means be unclean or in a dilapidated and unsightly condition; on the contrary, it requires constant care. It should be open to the sun and air, secure against unpleasant, and of course against unhealthful, surroundings, and always



WROUGHT IRON GATE WITH STONE POSTS

within easy oversight of the teacher. It should be visibly clean also, free from all kinds of loose rubbish and everything that could be offensive to health or good taste. In a word, it should be an out-of-door gymnasium. It would be entirely practicable to provide gymnastic apparatus of the simple kinds which may properly be exposed

to the weather, although this is of doubtful expediency, especially where the children of all ages take their exercise in the same yard. But absolute cleanliness should be insisted upon in all the surroundings of the school-house as well as within it. If the boys can be made to feel that it is a disgraceful thing to injure or disfigure the common play ground or anything belonging to it, they have learned the first lesson in future good citizenship.

A COMBINATION OF STONE, BRICK, TERRA COTTA, IRON AND GLASS.

Of course the limits of the play grounds should be well defined, and it should be understood that within those limits the ground itself has no rights that may not be properly sacrificed for the purposes of legitimate play. Outside of those limits it should be equally well understood that turf, trees, flowers, walks, and fences have the first claims. If play cannot be carried on without injury to those things the play must stop.

And this brings me to the second department of the exterior, which will be composed of all the land belonging to the school-house which is not occupied by the building and the play grounds. Here the tables are turned; play has no rights; carelessness is not to be tolerated The children, as well as the teachers, must understand that

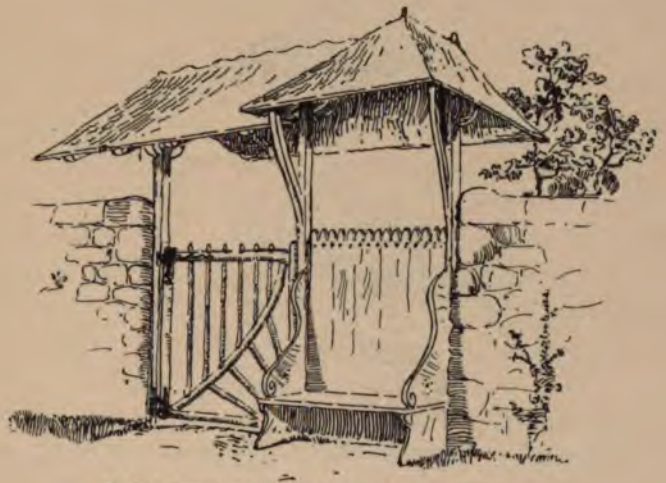
everything which will add to the beauty and charm of the place is to be carefully preserved. The turf must be respected; the walks must not be torn up; the trees must not be tormented; the flowers, whether wild or cultivated, must not be stolen. They may be gathered under proper restrictions and should be used daily, if possible, to adorn the school-rooms. Many kinds of flowers are all the more lavish of their bloom if they are constantly gathered, and these should be cultivated as well as those whose beauty is most lasting on the lawn. It is not the purpose of this chapter to give minute instruction

for these things, with catalogues of trees, shrubs, and flowers that are suitable, with directions for planting them, but simply to urge their importance.

There is nothing that yields such liberal return for what it asks as the decoration of the grounds around a building of any kind. Fine architecture, costly construction, expensive materials are to a great extent thrown away if the landscape surroundings and accessories are mean and unsightly. I use the word landscape in a broad sense, meaning everything on the premises except the building itself, whether these premises consist of a meagre spot of ground, less in area than that which is covered by the buildings, or a broad tract in which real landscape effects are possible. There is no district so poor, no land so sterile, that the labor and care which are necessary to arrange and execute a successful game of base ball would not, if expended once a year, make the grounds around the school-house a place of beauty, a source of honorable pride. The value of such an object lesson in

any community cannot be over-estimated ; its influence grows stronger and deeper the longer it lasts.

Generally speaking, I should say that the successful treatment of this department depends upon two things : First, the separation of the play grounds from the portion that is to be carefully kept in an ornamental condition as has been indicated ; and secondly, the aiming at simple results by the use of such simple means as are always within easy reach, rather than attempting to produce rare or striking effects. Everywhere can be had for the asking and the digging, all



SHELTERED GATEWAY AND SEAT.

the ornamental trees, shrubs, flowering plants, and climbing vines that could be used in embellishing the school grounds and buildings. Doubtless the nurseries can furnish more elaborate, and from a certain point of view, more elegant decorations of foreign ancestry than the adjacent forests and meadows will supply. But the difference in quality is slight at the best, and the greater facility with which native, indigenous trees and plants of suitable kinds can be reared, especially if they have had a few years' growth in a nursery, and their greater powers

of endurance will more than compensate for their inferior beauty, if they can be said to be less beautiful. Furthermore, it is a great mistake to force trees to assume unnatural shapes. It seems to have been a fixed habit of our heroic ancestors to postpone indefinitely the reward for well doing, to accept without complaint whatever hardship or privation fell to their lot, in fact, rather to court present discomfort as a wholesome discipline. It may have been something of this spirit that prompted them to have apparently more regard for the next generation than for their own immediate advantage, even in their tree-planting.

Whatever the cause, it is obvious that their most conspicuous achievements in this direction consisted in placing single trees in regular rows, the trees being of such size, shape, and nature, that anything like natural grace and beauty was impossible for them, until those who had taken the pains to plant them were no longer able to look upon the results of their labor. It might be well for us to cultivate this self-sacrificing habit of theirs in some directions, but not in this. At the best, a row of maples or elms, disposed in the usual formal fashion, add neither beauty nor comfort to the landscape until many years after they are set ; while if trees of different ages and kinds are planted in groups gracefully disposed, they will assume a picturesque appearance before the first season is fairly over, and long before the discon-

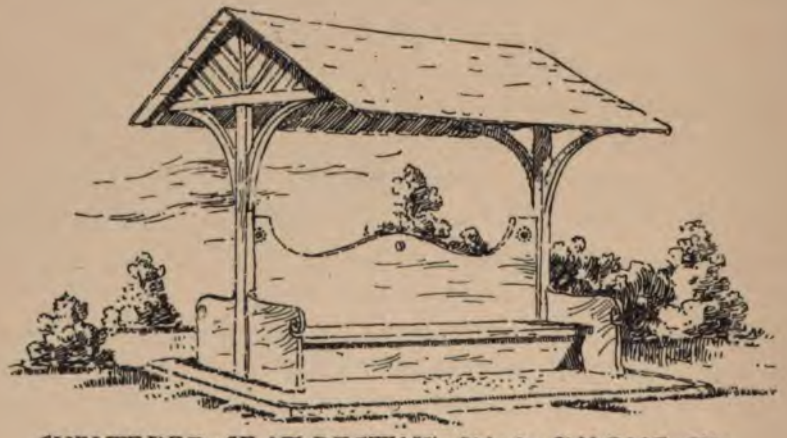
solate ranks of maples and elms show anything more than small tufts of foliage perched on the top of a ten-foot pole, clumsily supported, perhaps, by wooden frames, they will seem as much at home as the noble avenues that our great grandfathers set a century ago. Of course it is the part of wisdom to look out for the future while adding to the value of the present, and each group of trees and shrubs that is intended to be an ornament to the lawn before it has passed its third season of transplanting, should contain a long-lived sturdy tree, that will sometime in the future prove itself able to take the place that was at first filled by the more rapidly growing, but shorter lived group of which it was the centre.

There are certain trees that, like certain people, do not seem to be rightly constituted for growing old. As children they are all that is graceful and charming, but age renders them gloomy and depressing. As commonly used for ornamental purposes, evergreens appear to belong to this class. Others do not attain their greatest excellence until they have put on the formal dignity that comes with years. It is unnecessarily tiresome to wait for the latter to become attractive, and for the former, all that need be said is that the axe will quickly remove them, and their places are easily filled.

There is a strange sort of superstition among those who profess a fondness for natural beauty, to the effect that there is something sacred about a tree that should lead us to preserve it even when it really cumbers the ground and has become a nuisance. The same sentiment logically carried out would leave the weeds to grow undisturbed among the flowers. Trees out of place are simply weeds of larger growth, and when they interfere with the welfare of other, more valuable lives, they should be removed as promptly as we remove weeds from the cornfield. The popular protest against the wanton and wasteful destruction of large forests is to be encouraged; but this loss can no more be met by the planting of trees in villages and suburbs, either by improvement societies or by individuals, than climates can be changed by bonfires and steam heaters. The man who plants a shade tree is almost as liable to become a nuisance to his fel-

low-men as a benefactor. Two blades of grass are worth more than one—after they are made into hay, and a fruit tree well cared for increases the supply of necessary food in the world; but a tree that brings forth nothing but leaves, that is to say, nothing but shade, may be a blessing and it may be a curse. If shelter from bleak winds and the direct rays of the sun are desired in its neighborhood, it will be welcome to the ground it occupies; if dryness and warmth and sunshine, then it is only fit to be hewn down and cast into the fire.

Fences are doubtless a necessity about the department of the play grounds, and in most cases a visible boundary should enclose the entire



SHELTERED SEAT RESTING ON A PAVING OF ASPHALT WITH STONE COPING

lot. The public property of a town or city ought to be respected as thoroughly as that of private individuals, but as a matter of fact it is not, and while the practice of omitting the fences between neighbors on village streets is most satisfactory both in its visible effect and as an evidence of neighborly harmony, this would not often be admissible in regard to the school-house grounds. In a well civilized community the fences need not, however, be in the nature of impassible barriers, but simply courteous reminders that the public are desired to keep off

the premises. These visible boundaries may be of an ornamental pattern where the circumstances admit an outlay for that purpose, but the first consideration should be to secure the utmost durability. However wise it may be for individuals to temporize in their expenditures on the ground that it may be easier to spend more freely at some future time, public expenditures as a rule should be made on the principle that the best is the cheapest. If wooden fences are built they should have stone or iron supports in the ground, or where this is impracticable none but the most durable woods, as chestnut, cedar, and locust, should be used. If there is a front gateway which is not a common thoroughfare for the scholars, this may properly be somewhat ornamental, but the entrances that are in constant, and often hurried and crowded use, should be entirely simple, and unless they are also exceedingly strong they might as well be omitted altogether. These gates should be securely fastened open during the school hours, and no opportunity given for the indulgence of that propensity to "swing on the gate," which appears to be one of the ever present instincts of childhood. Iron fences and gateways can be obtained at moderate outlay, and are often the most economical.

For enclosing the play ground of village and suburban sites, there seem to be no alternatives beyond a close board fence or a solid brick or stone wall. The height of this will depend upon the amount of protection that is required, not for the yard itself, but for the adjacent property. Where dwellings are near the school grounds a barrier that is practically impassible is to be desired. Even with that the schoolhouse is not likely to be considered a desirable neighbor. This objection can be obviated to a great degree by keeping the buildings and the ground in front of it in such a condition of attractive neatness that the pleasure of being near it will compensate for the disadvantages.

The designs for fences, copings, and gateways that are introduced in this chapter are intended as suggestions for varying conditions, some of them being exceedingly simple, others more elaborate and expensive. It is hardly necessary to suggest that it is far better to

adopt a simple style and construct it thoroughly, than to attempt a more costly design and execute it in a cheap and insecure manner.

A country school, where a part of the pupils come from a considerable distance and remain at the school-house during the hour between the morning and afternoon sessions, should have a sheltered

porch, either attached to the building or standing near it on the pleasantest part of the grounds, but not in the play ground. Even a platform of rough boards, slightly raised, that will be free from the dampness of the earth, is of great service, and if it can have nothing better let it have such a coarse roof as would be provided for cattle or sheep in a pasture that affords no natural shelter for the stock.

This useful appendage lends itself very readily to ornamental purposes, and with slight additional cost and a careful study of the design it may be made to add greatly to the beauty of the grounds as well as to the comfort and enjoyment of the children, who will not insist upon catching cold by sitting on the damp ground, if they can have something else out of doors to sit upon. Of course these things should also be substantially built, and as impervious to injury or defacement as possible. Rustic work is picturesque, but is too easily defaced to be desirable.

These things are not useless expenditures. Whatever makes the school and all that belongs to it attractive to the children may be counted as a direct aid to education. There are always those who, in common phrase, are not fond of school, and these are likely to be the very ones who most need its refining, elevating influences; moreover, it must be admitted that in such cases the trouble is not always with the scholars.

There is another practical side to a liberal outlay for appearance's sake; the best teachers will naturally be most willing to accept the charge of schools where there is visible evidence of the active sympathy and co-operation of parents. There can be no stronger testimony on that point than care and attention freely bestowed upon the school house and its surroundings.

CHAPTER XXVII.

DETACHED SUGGESTIONS.

AT the present time a cesspool to receive the waste from the water-closets of a school-house is inexcusable. It is in outrageous opposition to sanitary science and common-sense.

No school grounds are complete without a sheltering porch or pavilion, under which the scholars can sit when the sun or rain prevents their being actually out from under cover and on the ground. Porches attached to the main building serve something the same purpose, but cannot always be had without obstructing the light of the school-rooms or causing other inconvenience.

THE walls of school-rooms should neither be white nor glossy. If plastered they should have three or four coats of oil paint in light, neutral tints, the walls and ceilings very nearly alike. The wood-work, the doors, and standing finish, should be treated in the same way unless the natural color of the wood is preserved, in which case the wood should be thoroughly filled with a hard, water-proof filler and rubbed perfectly smooth, but still without gloss. Light woods are preferable to dark.

SHADE-TREES should stand at a respectful distance from the school-house, at least twice their own height when fully grown.

THE summer comfort of school-rooms in buildings of one story and of the rooms in the top story of higher buildings will be greatly increased if the space between the ceiling and the roof is well ventilated. This is easily accomplished by making outlets through the roof near the ridge and corresponding openings through the under surface of the cornice, the planceer, between the rafters.

STAINED glass has no place in the regular windows of a school-room. If it is introduced for ornamental purposes, its light should not be allowed to shine inside except on purely ornamental occasions.

GENERALLY speaking, north and south lighting is better than east or west. Of the last two, when the school is not opened before nine in the morning or closed before half after four or five, the east is preferable.

BLACKBOARDS should not be placed on the wall of the room between or beside the principal windows; and if it is thought necessary to have a large amount of blackboards, they should be furnished with curtains or screens to cover them when they are not in use.

To discuss the best methods of providing fire-escapes for large school-houses, several stories in height, is folly, as regards new buildings, for it is a capital crime, and should be punished as such, to build large school-houses that are not fire-proof.

IF windows require partial covering on account of too strong light at any time, the lower part should be covered rather than the top.

The well that supplies drinking-water for a school-house should be remote from the privies and any other possible source of contamination. Other things being favorable, the best place for it is in the front yard, where a neat well-house, and a pump that empties itself in cold weather, will make it both useful and ornamental. It sometimes happens that the location of the well cannot be changed, while that of the school-house may be. In such cases the well should determine the location of the building.

The chief danger in case of fire in a school-house or other crowded building is from panic, and this is liable to occur when there is no fire, even in a fire-proof structure. For that reason the principal doors of exit should open outwards, and when the building is occupied should be left unfastened.

It is of the utmost importance that the cloak-rooms should be thoroughly ventilated, liable as they are to be filled with hats, coats, boots and shoes, that are damp and dirty. It is also desirable that they should be warm, but far more important that they should be abundantly supplied with fresh air.

The best floor for a school-house basement is asphalt pavement of the most substantial kind. It is comparatively expensive, but in many cases will be found the cheapest in the end. If boards are used, they should be of hard wood, nailed to small sleepers bedded in concrete. A brick pavement is dusty and easily disturbed.

INDEX TO SUBJECTS.

	PAGE
ALTERATIONS	100, 107
BRICKS	77
BLACKBOARD	126
CEILINGS	38, 61
CLEANLINESS	90
COLOR	126
CLOAK-ROOMS	127
DAMPNESS, SOURCES OF	2
DOORS	93, 127
DRAINAGE	4, 126
FIREPLACES	9
FURNACES	33
FOUNDATIONS	64
FIRE-PROOF BUILDING	59–127
FENCES	122
FLOORS	127
HEATING	83
PORCHES	22–126
PRIVIES	29
SITES, PREPARATION OF	1
STOVES	13, 19, 24, 99
SHINGLES	15, 57
STONE WALLS	70
TRANSOMS	18
TREES	121, 126
VENTILATION	15, 46, 83, 89, 109, 126, 127
WATER CLOSETS	83
WARDROBES	101
WINDOWS	6, 24, 95, 99, 103
WELLS	127

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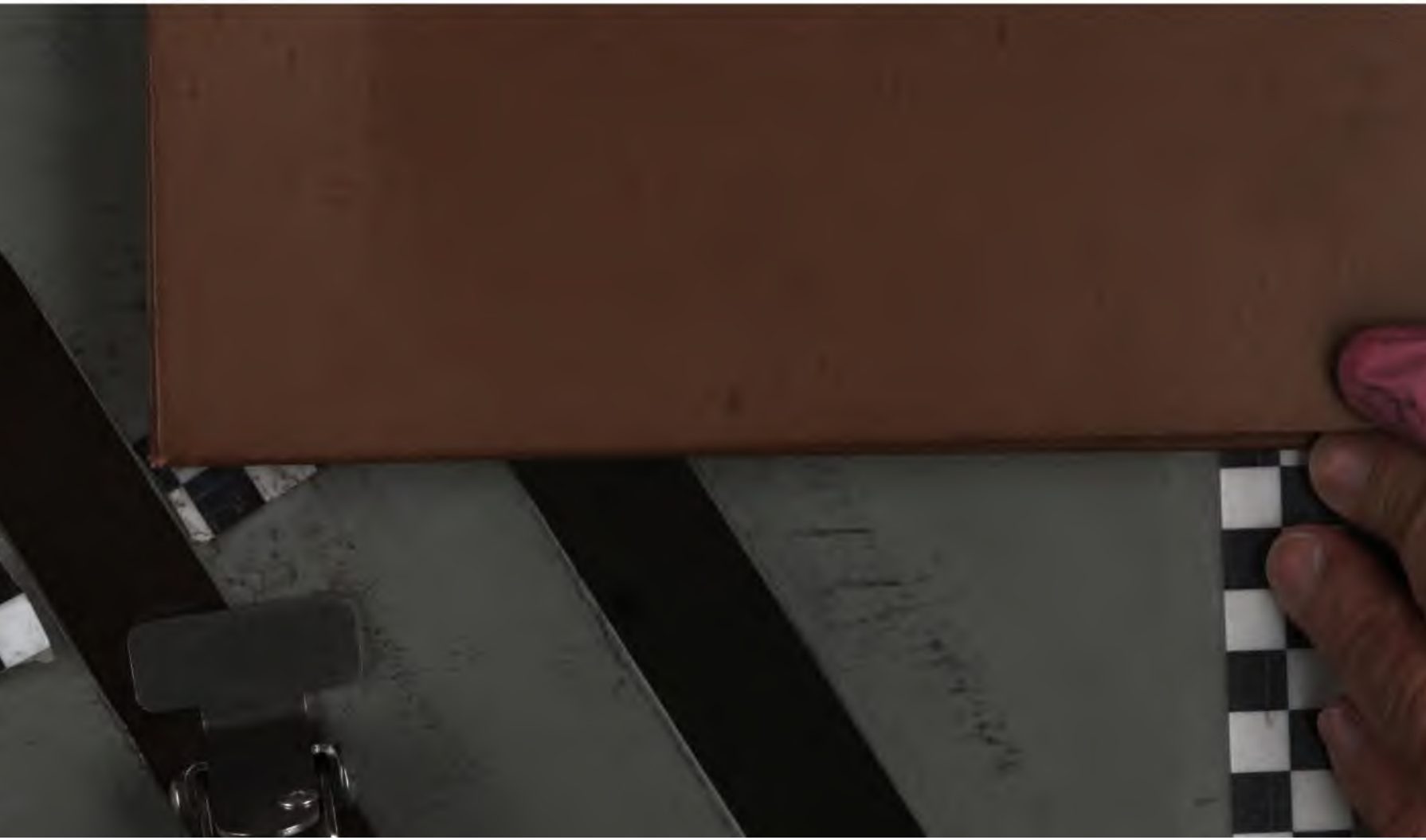
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